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MANAGEMENT CONSULTING & RESEARCH, INC.

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TR-8606/8-3

COST MODEL/DATA BASE CATALOG

FINAL REPORT

VOLUME 1: PROJECT SUMMARY

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15 August 1987

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PREFACE

Management Consulting & Research, Inc. (MCR) has provided support to the Air Force Cost Center (HQ USAF/AFCCE) under contract F33657-85-D-0063/0008 issued 13 August 1986. The purpose of this project was to survey the models and data bases being used for cost analysis within the Department of Defense (DoD) and to provide an automated catalog of these tools for use by Air Force and other cost analysts within DoD.

This technical report covers the contractual requirement for a final report (Contract Data Requirements List Sequence Number 1010) documenting the results of the survey and outlining procedures for updating the catalog. Additional reports submitted under this contract include:

- TR-8606/8-1, Functional Requirements Document, dated 17 October 1986; and
- TR-8606/8-2, Cost Analysis Resources Reference System (CARRS) User's Manual, dated 22 May 1987.

This final report is presented in two volumes as follows:

- Volume 1: Project Summary, and
- Volume 2: Final Data Base.

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I. INTRODUCTION

This technical report presents the results of the DoD cost model/data base survey effort. This introductory section provides an overview of the project and covers the:

- background,
- purpose of the project, and
- organization of the report.

A. BACKGROUND

Various cost organizations and product divisions within the Air Force are responsible for developing timely and accurate cost estimates for current and future United States Air Force (USAF) acquisition programs. A wide variety of cost models and data bases are used to accomplish this objective. In addition, the other services and various Department of Defense (DoD) organizations have developed similar tools to support their own estimating requirements.

Other catalogs have been prepared on the models and techniques being used in the DoD cost analysis community. During this effort, MCR looked at many of them. The majority of the studies were:

- limited in scope, either to a certain service or organization;
- confined to a certain subject area, such as software or logistics;
- did not include cost data bases; and
- listed only automated models.

They varied in the type, amount and quality of the information contained in them. There was no easy way to update them short of performing another complete survey and it was impossible for an analyst to quickly search and find a particular tool.

It was felt that a PC-based, on-line catalog which was updated regularly and had the support and participation of the users, that included all of DoD and encompassed all areas of cost analysis would be of substantial benefit to all DoD cost analysts. A comprehensive catalog of cost estimating resources would encourage:

- sharing of existing tools,
- development of new tools, where necessary, and
- consolidation of research efforts.

B. PURPOSE

The Air Force Cost Center undertook the task of developing a comprehensive catalog of cost analysis resources. Management Consulting & Research, Inc. (MCR) was tasked to survey the organizations within DoD and compile descriptive information on the models and data bases used for cost analysis. In order to facilitate the storage and retrieval of the survey information, MCR also developed, as part of this contract, an automated cataloging system, the Cost Analysis Resources Reference System (CARRS), designed to run on microcomputers.

The CARRS is a user-friendly, menu-driven computer program which contains the descriptive information, collected under this effort, on the models and data bases used in the DoD for cost analysis. It provides the analyst with an on-line search

capability to find the appropriate tool for an estimating application.)

A summary outline of the tasks and subtasks performed under this effort is shown in Exhibit I-1. The purpose of this report is to document the work performed under Task 3, Survey USAF Cost Estimating Tools and Task 4, Survey Other Services' Cost Estimating Tools. The development of the cataloging software, Tasks 1 and 2, are documented within TR-8606/8-1, Functional Requirements Document and TR-8606/8-2, Cost Analysis Resources Reference System (CARRS) User's Manual and are not addressed in this report. This document presents the results of the DoD survey, the procedures and formats used during the data input process, and recommendations for maintaining the catalog data bases. (KP)

C. ORGANIZATION OF THE REPORT

There are two volumes to this final report. Volume 1 presents the project methodology and summary of the survey results. Section II of Volume 1 describes the data collection and analysis methodology used by MCR to construct the DoD cost model/data base catalog. This section also presents the results of the DoD organization survey. In Section III, MCR presents recommendations for the development of a catalog maintenance plan. Section IV describes in detail the procedures MCR used in entering and validating the catalog. These procedures are translated to a set of maintenance steps which MCR recommends be used for future catalog revisions. This report concludes with a section discussing MCR's observations and conclusions regarding the conduct of this effort.

TASK 1: DEVELOP PROTOTYPE DESIGN

- 1.1 DATA BASE DESIGN
- 1.2 PRELIMINARY SYSTEM DESIGN
- 1.3 REVIEW AFSC LIBRARY MANAGEMENT SYSTEM
- 1.4 FINAL SYSTEM REQUIREMENTS & DESIGN

TASK 2: DEVELOP PROTOTYPE

- 2.1 DEVELOP MENU STRUCTURE
- 2.2 PROGRAM AND TEST SYSTEM
- 2.3 WRITE USER'S MANUAL

TASK 3: SURVEY USAF COST ESTIMATING TOOLS

- 3.1 DEVELOP SURVEY FORMS AND WRITE LETTERS OF INTRODUCTION
- 3.2 IDENTIFY POTENTIAL SOURCES
- 3.3 SEND SURVEY FORMS
- 3.4 EVALUATE RESPONSES, MAKE FOLLOW-UP CALLS
- 3.5 CALL/VISIT TO COLLECT ADDITIONAL SURVEY INFORMATION
- 3.6 ENTER DATA USING DEVELOPED SOFTWARE

TASK 4: SURVEY OTHER SERVICES' COST ESTIMATING TOOLS

- 4.1 MODIFY LETTER OF INTRODUCTION IF NEEDED
- 4.2 IDENTIFY POTENTIAL SOURCES
- 4.3 SEND SURVEY FORMS
- 4.4 EVALUATE RESPONSES, MAKE FOLLOW-UP CALLS
- 4.5 CALL/VISIT TO COLLECT ADDITIONAL SURVEY INFORMATION
- 4.6 ENTER DATA USING DEVELOPED SOFTWARE

Exhibit I-1. SUMMARY TASK OUTLINE

MANAGEMENT CONSULTING & RESEARCH, INC.

There are six appendices to Volume 1 of this report. Appendices A and B contain the forms used by MCR to collect the necessary information about the cost tools and enter the information into the catalog. Appendix C contains the list of DoD organizations which participated in the survey effort and should be included in the distribution of the catalog. Appendix D provides an alphabetical list of the cost tools compiled during this effort. Appendix E contains the list of consistency checks that should be performed on the catalog after revisions are completed. Appendix F contains a list of the common abbreviations and acronyms used in the catalog descriptions and a list of key words.

The second volume is a printed copy of the final catalog records. The catalog is in numerical order by identification number. The structure of the identification number naturally groups all the models and data bases separately. Within each of these sections, the catalog is further divided into DoD organizational groupings, e.g., Army, Air Force, Navy, etc.

The Cost Analysis Resource Reference System (CARRS) User's Manual, TR-8606/8-2, is a companion to this final report. For the users of the catalog, it explains the structure of the data bases and gives the instructions for adding, changing, searching and browsing the information.

subtasks for surveying both the Air Force and other services.

These subtasks were:

- establish project scope,
- develop survey forms and write letters of introduction,
- identify potential sources,
- set data collection criteria,
- send initial survey forms,
- evaluate responses/make follow-up calls,
- call/visit to collect additional survey information,
- enter data using developed software,
- verify catalog through participants, and
- enter corrections/additions to catalog.

The following subsections detail the data collection plan and survey execution.

1. Establish Project Scope

At the start of the project, MCR met with the Cost Center staff to establish the scope of the project. During that meeting, it was decided that MCR would not collect the actual models and data bases or any accompanying documentation. MCR would only develop descriptions of the resources. This would leave control of dissemination in the hands of the owner organizations. Resource release would be handled directly between DoD organizations.

It was also established that this effort would deal only with cost tools that were in existence or that were in the final stage of completion and would be in existence by the end of

the fiscal year (30 September 1987). The scope did not include any tools which were only planned or in progress. It was decided to include all areas of cost analysis within the survey. Tools would be selected to encompass every phase of the life cycle: development, production, operating and support (O&S). We would also try to collect information on risk or competition assessment models. Automated as well as non-automated resources were included in the study.

Because this was an Air Force funded effort, MCR would concentrate on collecting descriptions of the models and data bases from the Air Force organizations first. In addition, only areas of interest to the Air Force would be addressed when surveying the other DoD organizations, such as the Navy, Army and OSD. The areas of emphasis would be:

- aircraft,
- missiles,
- space/strategic defense (SD) systems,
- electronics/communications, and
- software.

If the other participating organizations were interested in adding their specific interest areas to the catalog (e.g., ships and tanks), the Air Force had no objections to including them if the organization would provide the additional funding needed to collect information about these resources.

It was also decided that MCR would not evaluate the models/data bases, whose descriptions were included in the catalog. It was felt that this would help alleviate any

resistance we might encounter when trying to collect the necessary information about "individually" developed models. A summary of the project scope is included as Exhibit II-1.

2. Develop Survey Forms and Write Letters of Introduction

Based on previous experience, MCR formulated a preliminary list of information to be collected and entered into the catalog for each model and data base. MCR looked at several previous surveys and evaluated the information collected in them. They included:

- DoD Cost Research Survey, September 1978, OSD CAIG;
- Life Cycle Cost Model Reference Guide, April 1983, ASD/LCCM; and
- Analytical Methods Survey, June 1981, NASA.

In addition, we looked at the catalog listings from both the Armament Division (AD) and Aeronautical Systems Division (ASD) cost libraries. The data structure of the Data Trek Library software being used by the Cost Center for their new cost library was evaluated. A : item list was developed which incorporated the best features of all of the studies. However, because the Cost Center would be primary users of the software, we decided to keep the structure as similar to the Data Trek system as possible. This would help eliminate any confusion involved in using the two pieces of software. Exhibit II-2 gives the resulting data element structure along with the definitions for each field.

MCR developed an initial survey form and drafted a letter of introduction which was sent to all potential sources.

- COLLECT INFORMATION ON EXISTING RESOURCES ONLY
- DEVELOP MODEL/DATA BASE DESCRIPTIONS ONLY
- ENCOMPASS ALL PHASES OF LIFE CYCLE
- COLLECT BOTH AUTOMATED AND NON-AUTOMATED TOOLS
- FOCUS ON AIRCRAFT, MISSILES, SPACE/SD SYSTEMS, ELECTRONICS, AND SOFTWARE

Exhibit II-1. SUMMARY OF PROJECT SCOPE

MANAGEMENT CONSULTING & RESEARCH, INC.

<u>Data Element</u>	<u>Definition</u>
ID Number	A system assigned number given sequentially to every model/data base entered into the system.
Resource Type	Model or Data base. If the resource is both, two entries should be made in the catalog, one for the model and one for the data base.
Resource Name	Common identifier given to the resource by the developer or controlling activity. If the name is an acronym, include both the acronym and full written title.
DoD Designation	Controlling Activity's DoD affiliation.
Security Classification	Unclassified, For Official Use Only, Confidential, Secret, or Proprietary.
Controlling Activity	Name of DoD organization presently using/maintaining resource. List organization/office code first, full name in parentheses.
Point of Contact	Name of individual within Controlling Activity responsible for resource. Enter title, first and last name.
Phone Number	Autovon or commercial number, with area code, of point of contact.
Mailing Address	Full mailing address of Point of Contact or Controlling Activity. Include office code (if needed) and zip code.

Exhibit II-2. DATA ELEMENTS DESCRIPTION

MANAGEMENT CONSULTING & RESEARCH, INC.

<u>Data Element</u>	<u>Definition</u>
Resource Obtainable	Is the resource available to user's outside controlling activity. Yes, No, or Case by Case.
Call Number	DTIC, DLSIE, or local library reference number.
Resource Developer	Name of contractor or Government organization responsible for resource design and development.
Implementation Date	Approximate date development completed or system first operational, month/day/year.
Date of Last Update	Approximate date of last revision or update, month/day/year. If a revision is underway, fill in expected IOC.
Document Title	List the titles of all resource documentation.
Documentation Available	Indicates for each piece of documentation whether a copy may be obtained by another DoD organization or analyst.
Documentation Collected	Designates whether documentation was obtained under this survey effort.
Description/Uses	Up to five lines describing the resource so that a potential user can judge its appropriateness.
Special Features	Up to three lines describing any of the resource's special capabilities, e.g., graphics, special reports, etc.
Limitations	Up to three lines describing user-oriented restraints such as user fees and restrictions to resource availability, e.g., proprietary data. This area may also be used to describe any drawbacks or deficiencies in the resource.

Exhibit II-2. DATA ELEMENTS DESCRIPTION (CONT'D)

MANAGEMENT CONSULTING & RESEARCH, INC.

<u>Data Element</u>	<u>Definition</u>
Resource Automated	Designates whether model/data base resides on computer system. Indicate yes, no, or unknown.
Equipment Type	If resource is automated, indicates the type of equipment, e.g., IBM PC/compatible, Z-100, VAX, etc.
Operating System	If resource is automated, indicates the operating system required to run the software.
Memory Requirements	If resource is automated, lists any memory requirements to run the package.
Programming Language	If resource is automated, indicates any language or compiler required to run software, e.g., dBase III, COBOL, FORTRAN.
Key Words (10)	Set of standard phrases which describe the model/data base and can be used as search criteria.

Exhibit II-2. DATA ELEMENTS DESCRIPTION (CONT'D)

The initial survey form asked only for the name of each cost model/data base used, a short description, and a point of contact. This information would help us evaluate the cost tool's potential for inclusion in the catalog and would give us an information source during the detailed part of the effort. The letter of introduction, which explained the project in detail and requested assistance in the survey effort, was drafted for the Cost Center. The text of this letter and a copy of the initial survey form can be found in Appendix A.

3. Identify Potential Sources

The next step consisted of developing a list of DoD organizations which might yield cost models and data bases useful to the Air Force and other DoD organizations. MCR began by performing a document search through the Defense Technical Information Center (DTIC) and the Defense Logistics Studies Information Exchange (DLSIE) for "cost models" and "cost data bases." Both DTIC and DLSIE are central repositories for DoD technical reports. We believed that we would be able to uncover the major sources of cost tools in this way. This assumption proved correct. Based on the analysis of these searches and on our experience in the DoD cost community, MCR developed the following list of potential model/data base sources.

- Air Force:
 - Air Force Systems Command (AFSC),
 - Air Force Product Divisions [Armament Division (AD), Aeronautical Systems Division (ASD), Ballistic Missile Office (BMO), Electronic Systems Division (ESD), and Space Division (SD)],

- Air Force Logistics Command (AFLC),
- Contract Management Division (CMD), and
- Air Force Cost Center (AFCCF);
- Navy:
 - Naval Center for Cost Analysis (NCA),
 - Naval Air Systems Command (NAVAIR),
 - Naval Sea Systems Command (NAVSEA), and
 - Space and Naval Warfare Command (SPAWAR);
- Army:
 - Cost and Economic Analysis Center (CEAC), and
 - Army Materiel Command (AMC);
- Office of the Secretary of Defense (OSD);
- Defense Logistics Agency (DLA);
- Defense Communications Agency (DCA); and
- Strategic Defense Initiative Organization (SDIO).

The principal cost analysis organizations within these sources were contacted and their participation in the project solicited. At that time, we asked them to identify any other organizations which should be contacted. Several additional organizations were proposed:

- Logistics Modeling & Resource Analysis Division (ASD/ALTE),
- HQ Air Force Acquisition Logistics Center (AFALC/XRS), and
- Naval Weapons Center (NWC).

The Engineering and Services Center (AFESC/DEC) at Tyndall AFB heard about the survey through briefings presented by the Cost Center and asked to participate in the survey. They

submitted an initial survey form and were subsequently added to the list. A complete list of the organizations which participated in the survey is included as Exhibit II-3. During the initial visit to ESD, the product division's cost libraries were found to be an invaluable source of cost tools and were added to the list.

4. Set Data Collection Criteria

After receiving over 500 abstracts to evaluate from the DTIC and DLSIE searches, it became essential to establish selection criteria to use in evaluating a resource for inclusion in the catalog. The purpose of this criteria was twofold. It would:

- eliminate out of date and superseded tools, and
- include only the most useful tools for cost analysis.

In preparing this list, MCR encountered varying definitions of what a model and data base consisted of in a cost application. We began by defining what would be included as a model or data base.

- A "model" is one or more CERs, factors or equations in which an analyst supplies certain variables and the model calculates a cost or other cost-related characteristic (e.g., manhours).
- A "data base" consists of a collection of information which can or has been used to develop relationships, factors or equations for analyzing cost. This includes cost data from contracts, cost/schedule reports and other sources, technical parameters and program data.

As the initial data collection effort progressed, an increasing number of potential resources were uncovered. It soon became

- AIR FORCE
 - AFSC/ACC
 - AD/ACC
 - ASD/ACC
 - BMO/ACC
 - ESD/ACC
 - SD/ACC
 - AFLC/ACCC
 - ASD/ALTE
 - AFALC/XRS
 - AFESC/DEC
- NAVY
 - NCA
 - NAVAIR
 - NAVSEA
 - SPAWAR
 - NWC
- ARMY
 - CEAC
- OSD/PA&E
- DLA
- DCA
- SDIO

Exhibit II-3. SURVEY PARTICIPANTS

MANAGEMENT CONSULTING & RESEARCH, INC.

apparent that some selection criteria would have to be imposed. A list of criteria was developed based on the over 1000 cost tools uncovered in the initial survey. As a result, it was determined that the catalog would contain:

- current tools (1975 to present),
- no general methodology studies,
- no generic spreadsheet "models," and
- no individual cost reports.

The following paragraphs define each criterion and explain the reasoning behind its inclusion.

a. Current Tools (1975 to Present)

This criterion was used primarily to evaluate models and data bases found in the different cost libraries, and through DTIC and DLSIE. It was assumed that any tool developed earlier than 1975, and which had not been updated, would be no longer useful to a cost analyst. However, there were some exceptions to this rule. For example, several landmark cost studies, dated before 1975, were included. In addition, older models were included if investigation proved they were still being used.

b. No General Methodology Studies

This criterion was also used primarily to evaluate models and data bases found in the cost libraries, and through DTIC and DLSIE. General methodology studies do not fit the definition of a model as given above. They do not include any

equations or relationships, but present a procedure for developing the equations or generating an estimate by other means.

c. No Generic Spreadsheet "Models"

It was decided not to include any general purpose spreadsheet "model," if it did not include any embedded relationships. With the advent of computer spreadsheet packages, like LOTUS 1-2-3, most analysts have created their own personalized spreadsheets, which they define as models, but are often simply tools used to sum up results through the Work Breakdown Structure (WBS) or Cost Breakdown Structure (CBS), or are used to adjust costs to constant year dollars using inflation indices. In addition, most of these "models" have little, if any, documentation. It was reasoned that it would be of little benefit to collect the hundreds of these types of tools.

d. No Individual Cost Reports

It was decided that it was not the objective of this effort to catalog the numerous cost reports available within the different organizations. An individual cost report would be of little use to an analyst and would decrease the utility of the catalog. The determination was made that only organized collections of cost reports would be sought and these would be designated as data bases.

5. Send Initial Survey Forms

MCR, with the help of the Cost Center, contacted the headquarters-level cost organizations within the Air Force, Navy

and Army. Meetings were held with the Air Force Systems Command (AFSC), the Naval Center for Cost Analysis (NCA), and the Army Cost and Economic Analysis Center (CEAC) to brief them on the project and enlist their participation. The effort was received enthusiastically, and all three cost organizations supported the project.

Through them, initial survey forms were sent to the Air force product divisions and the Navy material organizations. The Army Materiel Command was also contacted about participating in this effort. They declined to do so. AMC stated that they had no models which they wished to provide at that time. They had an ongoing Operational Baseline Cost Estimate (OBCE) project which would eliminate most of the outdated models they were using. As a result, they were dropped from the survey list.

MCR contacted OSD/PA&E, DLA, DCA and SDIO and arranged to brief them on the project. The project was well received by these organizations and their participation secured. The initial points of contact in these organizations performed the initial and follow-up surveys personally and sent us the results.

6. Evaluate Responses/Make Follow-up Calls

Air Force response to the initial survey was excellent. All product divisions responded and gave us their full support during this effort. The survey's AFSC contact checked with CMD and its subordinate commands and informed us that they did not use any general purpose cost tools. They were dropped from the survey.

Through NCA, initial surveys were sent to NAVAIR, NAVSEA, and SPAWAR. Only the NAVAIR initial survey was received. MCR contacted the other organizations directly. After receiving our project briefing, they were very helpful in providing the information requested. NAVSEA elected not to supply us with extensive information on their resources, but asked that the catalog entries refer interested analysts to the NAVSEA point of contact for additional information because of the proprietary nature of the cost tools they possess. We were successful in collecting from the ships, missiles and aircraft sections of NCA, but were not able to collect information from the electronics section.

CEAC did not have many resources to catalog. They are in the process of developing a myriad of models and data bases to meet the Army's cost analysis needs. Most of them will be on-line in the near future, and CEAC should be revisited periodically to collect them as they are implemented.

Because of the amount and detail of the information necessary to describe the cost tools, MCR decided it would be more productive to conduct on-site interviews with the various points of contact (POCs). Follow-up calls to all of the Air Force product divisions and Navy material organizations were made. Appointments were set up to interview the POCs for the resources identified during the initial survey. With the Cost Center's help, MCR contacted AFLC at Wright-Patterson AFB and arranged to brief them on the project. MCR also contacted the

librarians of the various product division cost libraries and made arrangements to use their facilities.

7. Call/Visit to Collect Additional Survey Information

With the initial survey and evaluation complete, MCR moved into the detailed phase of the survey. MCR began by visiting the Air Force product divisions (ESD, AD, ASD, SD, and BMO) and the Air Force Engineering & Services Center (AFESC/DEC). During these visits, MCR developed the detailed descriptions of the resources listed on the initial survey. We asked the POCs if they had knowledge of other organizations, such as laboratories or SPOs, which might have resources which should be cataloged. We then visited the cost libraries.

Each time MCR visited a POC or gave a project briefing to enlist someone's support, we always inquired if they knew of additional models that would be worthwhile investigating. Almost every POC referred us to at least one other source.

A data collection Resource Worksheet was developed for every cost tool that met the collection criteria. A copy of this worksheet form is given in Appendix B. MCR developed the detailed descriptions through documentation, primarily user's manuals, supplied to us by the point of contact during our visit. In that way, we took very little of the POC's time. However, there was some information which only the POC could answer such as "Resource Availability" and "Security Classification." Almost every model or data base described to us on the initial survey was automated in some manner. Our best source for non-automated models was the cost libraries.

ASD, AD, ESD and SD have organized cost libraries. Within these four libraries, we were able to fill in missing information on resources collected from the POCs, target other sources of cost tools and collect many non-automated resources such as cost report collections and CERs. They were a valuable resource during this effort. More than half of the catalog came from references found in the libraries.

8. Enter Data Using Developed Software

The model and data base information from the data collection Resource Worksheet was reduced to its final form and transferred to a Data Entry Worksheet. A copy of the Data Entry Worksheet has been included in Appendix B. The information on the worksheets was entered into the catalog using the CARRS software. After entry, the information was checked for consistency and accuracy, and any necessary changes were made using the edit/delete options of the Catalog Maintenance Menu. After the survey was completed, MCR developed a key word list, for searching purposes, based on the descriptions of the resources collected. This key word list can be found in Appendix F. For more detailed information on the data entry process see Section IV, Maintenance Procedures.

9. Recycle Catalog Through Participants

After completion of the catalog data entry process, a complete copy of the catalog was printed in "Controlling Activity" order. This catalog was divided into groupings by major controlling activity. A transmittal letter was attached to

each catalog listing. The major point of contact within each organization was sent the entries for their controlling activity. This POC coordinated the recycling effort within the organization and distributed the individual entries to the applicable point of contact for revisions. Each POC was asked to look through the listing submitted to them and make any corrections or updates to the model and data base entries. It also asked them to indicate any models/data bases that were no longer used and should be deleted from the catalog. A copy of the transmittal letter is included in Appendix A. The distribution list is included in Appendix C.

10. Enter Corrections/Additions to Catalog

MCR received corrections and updates from the following DoD participants.

- Air Force:
 - Armament Division (AD),
 - Aeronautical Systems Division (ASD),
 - Space Division (SD),
 - Air Force Logistics Command (AFLC);
 - Air Force Engineering & Services Center (DEC), and
- Navy:
 - Naval Air Systems Command (NAVAIR);
- Army:
 - Cost and Economic Analysis Center (CEAC);
- Defense Communications Agency (DCA); and
- Strategic Defense Initiative Organization (SDIO).

Nine out of the 17 participants responded to the recycling phase—about 50 percent. Most of the corrections were minor. The corrections were made using the edit/delete options in the CARRS software. Three resource records were deleted because of obsolescence. The catalog entries were again checked for consistency and accuracy before the final printing. The full printed catalog in "Identification Number" order is provided under separate cover as Volume II.

B. SURVEY RESULTS

During the planning phase, MCR projected that approximately 150 cost tools would be identified and cataloged during this effort. In fact, over twice that number were ultimately included. In this section, we will discuss the results of the DoD model/data base survey effort. The following three subsections summarize the results of the:

- initial survey,
- detailed survey, and
- final catalog.

1. Results of the Initial Survey

At the beginning of the survey effort, MCR performed a document search of the Defense Logistics Studies Information Exchange (DLSIE) and the Defense Technical Information Center (DTIC). The search of DLSIE resources using the key word "cost models" resulted in a total of 155 reports pertaining to cost

models and their sources. The search of DTIC resources on the key words "cost models" and "cost data bases" resulted in 387 reports.

The initial survey of the Air Force product divisions resulted in 206 additional resources. In addition to the initial survey, Armament Division sent us a copy of their cost library's document listing. From that listing, we identified 521 potential cost tools. Through our point of contact at ASD, we performed an automated search of the Cost Data Center. As a result, 514 potential resources were added. This gave us a total of 1783 resources, including duplicates, to investigate.

Using the limited information we had on these 1783 resources, we first eliminated all identifiable duplicates. This left us with a total of 819 potential resources. These 819 were then evaluated against the project scope and the data collection criteria. At the end of this process, we had narrowed the list to 439 possible resources. A breakout of these resources is shown in Exhibit II-4.

These resources were primarily from Air Force sources. A few Army and Navy tools were part of this number, because they were found in the searches of DTIC and DLSIE or they were listed in the product division's cost libraries. An initial survey was conducted within the Navy. However, only the NAVAIR survey was returned. NCA, SPAWAR and NAVSEA were contacted by phone and an initial count was obtained. This resulted in a total of 34 possible resources for the Navy. They were distributed among the organizations as follows:

- **TOTAL OF 206 FROM INITIAL SURVEY**

AD	--	99
ASD	--	25
BMO	--	3
DEC	--	52
ESD	--	9
SD	--	18

- **TOTAL OF 103 FROM DTIC AND DLSIE SEARCH**
- **TOTAL OF 130 FROM AUTOMATED SEARCH OF
ASD COST LIBRARY**

**TOTAL OF 439 POTENTIAL MODELS/DATA BASES
(PRIMARILY USAF)**

Exhibit II-4. INITIAL SURVEY RESULTS

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- NCA—11,
- NAVAIR—16,
- NAVSEA—6, and
- SPAWAR—1.

Briefings conducted with Army CEAC and the DoD organizations (OSD/PA&E, DCA, DLA and SDIO) indicated only a small number of cost tools to catalog in each organization. We did not consider it effective to conduct an initial survey. It was decided that these items could be easily cataloged during the detailed survey. MCR prioritized the detailed survey by the number of tools to be cataloged. We concentrated on collecting the Air Force resources first, followed by the Navy. CEAC and the other DoD organizations were collected at the end of the project.

2. Results of the Detailed Survey

With the formulation of the potential resource list of 439, MCR began the detailed survey. The objective of this phase was to collect detailed information on the resources identified on the initial surveys, identify any other resources which might be appropriate to add to the catalog, and investigate and catalog the resources identified from the cost libraries. To this end, the project team visited every Air Force product division and the Air Force Logistics Command (AFLC). We gave each organization a brief overview of the project. As we met with each cost organization, we further refined our list. A few of the tools listed on the initial survey were dropped, because they did not

meet data collection criteria; other cost tool sources were suggested. These were investigated and new items were added to the list.

The product division's cost libraries were an excellent source for collecting non-automated models and data bases. Their only drawback was that the items found there usually lacked current "Point of Contact" and "Controlling Activity" information. The intent was to collect this information through our established points of contact. We were able to search through all four libraries: AD, ASD, ESD and SD. In addition to new models and data bases, they also proved to be invaluable sources of additional documentation for many items with incomplete descriptive data.

After completing the Air Force detailed survey, we turned our attention to the other services' surveys. We visited each Navy organization, Army CEAC, OSD/P&E, SDIO, DIA, and DCA and briefed them on the project. During the visits, we began building the detailed resource descriptions.

At the end of the collection effort, worksheets for 517 different resources had been developed. Approximately one-third of them lacked some piece of essential information. We tried to fill in this missing information through our points of contact. However, 124 were eliminated from the catalog because they lacked critical information necessary to be of benefit to an analysis. The primary reason for exclusion was lack of point of contact or controlling activity information.

A draft of the catalog, with a total of 344 models and data bases, was sent to each participant in the survey. This recycle of the catalog resulted in the deletion of three outdated entries.

3. Results of the Final Catalog

The resulting catalog contains 341 cost resources. An alphabetical listing of the final catalog can be found in Appendix D. A breakout of the resources by organization is included as Exhibit II-5. In addition to the product divisions, AFLC and AFSC, resources were collected, through the libraries, from CMD, the Air Force Human Resources Lab (AFHRL), the Air Force Wright Aeronautical Laboratories (AFWAL), the Air Force Weapons Laboratory (AFWL), and Data and Analysis Center for Software (DACS). These are included in the "other" category under the Air Force. Although we could not go directly to the Army's AMC organizations we were able to collect resources through third parties (primarily, through the Air Force cost libraries) from the Communications-Electronics Command (CECOM), Aviation Systems Command (AVSCOM), Tank-Automotive Command (TACOM), Training and Doctrine Command (TRADOC), Missile Command (MICOM), and Armament, Munitions, and Chemical Command (ARCOM). Other Navy sources included the Pacific Missile Test Center, Navy Personnel R&D Center (NPRDC), and Naval Surface Weapons Center (NSWC).

Several commercial models are included in the catalog. These tools would not normally be within the scope of this effort. However, the models cataloged are ones regularly used by

AIR FORCE	--	176
AFSC	--	13
AD	--	11
ASD	--	57
BMO	--	3
ESD	--	18
SD	--	16
AFLC	--	13
AFALC	--	6
HQ AF	--	5
DEC	--	9
OTHER	--	25 (CMD, AFHRL, AFWAL, AFWL, DACS)
ARMY	--	39
CEAC	--	3
OTHER	--	31 (CECOM, AVSCOM, TACOM, TRADOC, ARMY MISSILES, ARMY WEAPONS)
NAVY/MARINE CORP	--	79
NCA	--	17
NAVAIR	--	19
NAVSEA	--	7
SPAWAR	--	1
NWC	--	24
OTHER	--	9 (NPRDC, NSWC)
MARINE CORPS	--	2
OSD	--	19
DLA	--	1
DCA	--	6
SDIO	--	3
COMMERCIAL	--	18
TOTAL		<hr/> 341

Exhibit II-5. FINAL CATALOG RESULTS BY ORGANIZATION

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several DoD organizations and were proposed to us by a DoD contact. They include the PRICE family of models and most of the better known software models, such as SLIM and COCOMO.

Of the 341 cost tools cataloged, 83 are data bases and 258 are models. Fifty-two percent, or 178 resources, are obtainable without restriction, 45 are obtainable on a case-by-case basis and 3 are listed as not obtainable. Almost 90 percent of the resources collected have some form of documentation and over half of them are automated. A complete breakout of the catalog is given in Exhibit II-6. A breakout of the models and data bases by DoD organization is shown in Exhibit II-7. Exhibit II-8 provides a graph of the distribution of cost tools within the Air Force. A breakout of the models and data bases by key word is shown in Exhibit II-9. Each cost tool can have up to 10 key words associated with it. Therefore, the numbers in Exhibit II-9 will not add to the totals given in Exhibit II-6. A breakout of the catalog by major equipment category is given in Exhibit II-10.

TOTAL NO. OF MODELS:	258
TOTAL NO. OF DATA BASES:	83
NO. OF MODELS OBTAINABLE:	137
NO. OF DATA BASES OBTAINABLE:	41
NO. OF MODELS WHERE DOCUMENTATION EXISTS:	226
NO. OF DATA BASES WHERE DOCUMENTATION EXISTS:	73
NO. OF MODELS THAT ARE CLASSIFIED:	13
NO. OF MODELS THAT ARE PROPRIETARY:	38
NO. OF DATA BASES THAT ARE CLASSIFIED:	12
NO. OF DATA BASES THAT ARE PROPRIETARY:	22
NO. OF MODELS THAT ARE AUTOMATED:	166
NO. OF DATA BASES THAT ARE AUTOMATED:	30

Exhibit II-6. CATALOG BREAKOUT

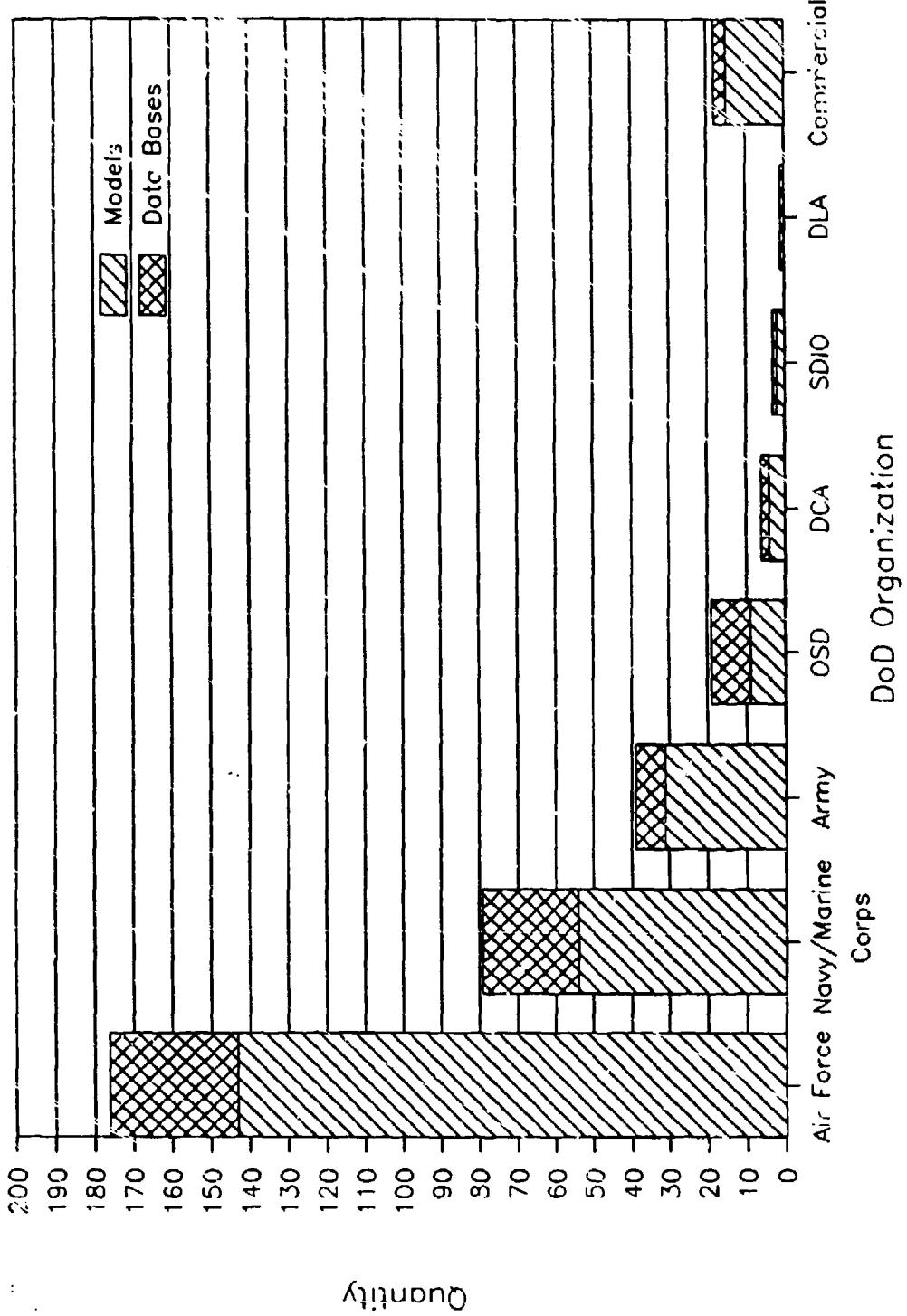


Exhibit II-7. CATALOG BREAKOUT BY DoD ORGANIZATION

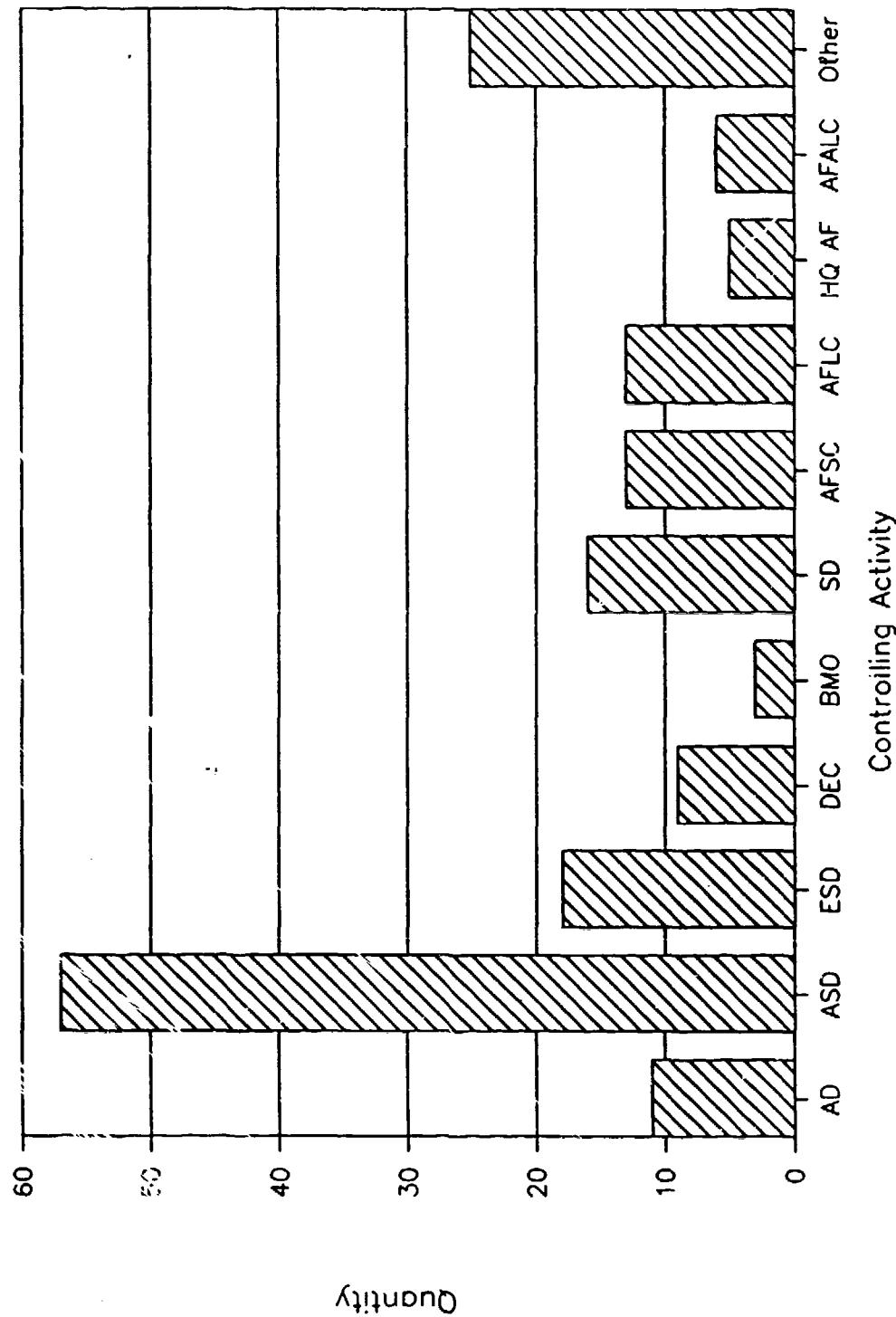


Exhibit II-8. CATALOG BREAKOUT BY AIR FORCE ORGANIZATION

<u>KEY WORD</u>	<u>NO. OF MODELS</u>	<u>NO. OF DATA BASES</u>
ADP	1	0
Aircraft	53	24
Aircraft (Airframes)	1	1
Aircraft (Engines)	16	8
Aircraft (Modifications)	4	0
Aircraft (RPV)	2	0
Analog Techniques	6	0
Armament	1	2
Avionics	25	1
Command & Control Systems	2	1
Communications	10	5
Composites	3	2
Concept Definition Costs	0	0
Construction Costs	11	1
Contract Analysis	0	2
Contractor Cost Data Report (CCDR) Analysis	2	8
Contractor Performance Report (CPR) Analysis	5	8
Cost Data	10	72
Cost Estimates/Analyses	232	1
Cost Estimating Relationships (CERs)	118	2
Cost Factors	37	3
Cost of Money (COM)	0	0
Cost/Benefit Analysis	2	0
Cost/Schedule Status Report (C/SSR) Analysis	2	4
Curve Fitting	7	0
Data Base	3	83
Decision Support Systems	0	0
Development Costs	63	27
Econometric Forecasting	4	0
Economic Analysis	5	0
Electronics	22	12
Electronics (Electro-optical)	0	1
Electronics (Electronic Warfare)	1	2
Electronics (Identification)	0	0
Electronics (Intelligence)	0	0
Electronics (Laser)	4	2
Electronics (Navigation)	2	1
Electronics (Night-Vision)	0	0
Electronics (Radar)	10	7
Electronics (Sensor)	2	1
Electronics (Sonar)	0	1
Engineering	6	1
Engineering Build-up Techniques	11	0
Engineering Change Orders (ECO)	2	0
Equipment Hour Data	0	3
Escalation Factors	6	0

Exhibit II-9. CATALOG BREAKOUT BY KEY WORD

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<u>KEY WORD</u>	<u>NO. OF MODELS</u>	<u>NO. OF DATA BASES</u>
Escalation Indices	1	1
Facilities	16	1
Financial Analysis	6	2
First Destination Transportation Costs	1	0
Flyaway	6	2
Forces	4	0
Functional Cost Breakdown	2	0
Government Furnished Equipment (GFE)	0	1
Indirect Costs	0	0
Installation	5	2
Integrated Logistic Support (ILS)	25	2
Labor Hour Data	1	9
Labor/Materials Breakdown	7	2
Learning Curves	8	0
Lease Costs	1	0
Life Cycle Costs (LCC)	46	3
Maintenance	5	0
Management Reserve	2	0
Manpower Data	0	2
Manpower Estimates/Analyses	13	0
Manpower Estimating Relationships (MERs)	4	0
Manufacturing	5	2
Markup	0	0
Missiles (Strategic)	3	0
Missiles (Tactical)	29	12
Modification Costs	9	4
Monte Carlo Simulation	7	0
Munitions	8	0
Nonrecurring/Recurring Breakdown	5	0
Operating & Support (O&S) Costs	56	10
Overhead	2	2
Parametric Techniques	66	0
Peculiar Support Equipment (PSE)	5	2
Performance Assessments	8	2
Planning Factors	1	1
Planning/Programming/Budgeting	11	0
Precision-Guided Submunitions	1	1
Primary Resource Breakdown	0	0
Prime Mission Equipment (PME)	5	0
Procurement Support	9	1
Production Costs	77	36
Profit	1	0
Program Analysis	0	0
Program Data	3	18
Requirements Estimates/Analyses	13	0
Risk Analysis	4	0

Exhibit II-9. CATALOG BREAKOUT BY KEY WORD (CONT'D)

MANAGEMENT CONSULTING & RESEARCH, INC.

<u>KEY WORD</u>	<u>NO. OF MODELS</u>	<u>NO. OF DATA BASES</u>
Satellite Earth Stations	2	1
Schedule Data	1	6
Schedule Estimates/Analyses	15	2
Schedule Estimating Relationships (SERs)	2	0
Selected Acquisition Report (SAR) Analysis	1	0
Ships	4	6
Site Activation	1	0
Software	22	4
Software (Embedded)	11	2
Software Sizing	2	2
Space Systems	2	2
Space Systems (Spacecraft)	9	3
Spares	16	3
Statistical Analysis	19	1
Strategic Defense	4	3
SWBS Weight Groups	1	0
Technical Characteristics Data	11	40
Test & Evaluation	3	0
Tooling & Test Equipment	8	1
Tracked Vehicles	0	2
Vehicles	0	0
Warranty Costs	1	1
Weapon Systems	12	4
Weight Estimating Relationships (WERs)	3	0
Wheeled Vehicles	0	1

Exhibit II-9. CATALOG BREAKOUT BY KEY WORD (CONT'D)

MANAGEMENT CONSULTING & RESEARCH, INC.

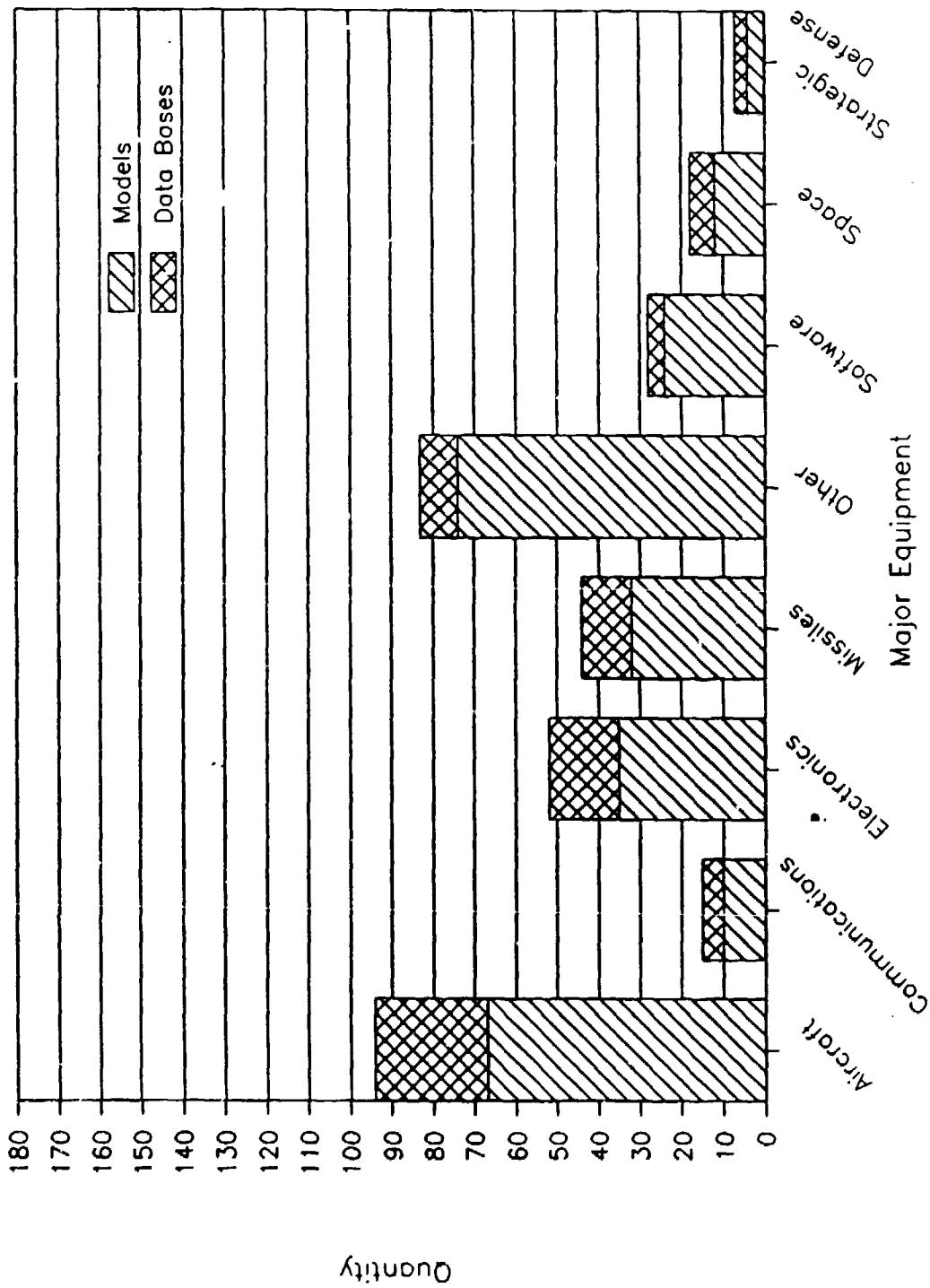


Exhibit II-10. CATALOG BREAKOUT BY MAJOR EQUIPMENT CATEGORY

III. CATALOG MAINTENANCE PLAN RECOMMENDATIONS

The completed catalog is a snapshot of the major DoD cost tools in existence as of the end of this project. For this catalog to remain a viable resource for the cost analyst, it must be revised regularly and new tools added as they are discovered or become available. One of the primary reasons for automating this catalog was to simplify the maintenance requirements and improve its chances of becoming a long-term tool for Air Force and other DoD cost analysts.

The Air Force Cost Center asked MCR to develop and outline a catalog maintenance plan and procedures for the upkeep of the catalog. MCR met with the Cost Center staff at the end of the detailed survey effort to develop the basis of this plan. The main points of the plan, decided upon at that meeting, are:

- centralized catalog maintenance,
- quarterly catalog maintenance, and
- manual revisions to the catalog.

These points are discussed in the next three subsections.

A. CENTRALIZED CATALOG MAINTENANCE

The usefulness of this catalog depends on the quality and accuracy of its information. This quality and accuracy can only be maintained by well-trained personnel with cost and CARRS' catalog experience. The user must rely on the expertise of the maintenance personnel to supply the accurate information needed to evaluate the cost tools contained in the catalog. Catalog

searches also require a consistent data set. A consistent data set is best achieved by centralized maintenance.

The Cost Center has committed itself to providing and maintaining this catalog as part of their cost library system. The necessary training has been provided to the Cost Center's cost librarian to ensure the proper maintenance of the catalog. The librarian will be able to call upon the Cost Center's staff for expert cost analysis help during the updating process. The cost librarian will assume the responsibilities of the catalog administrator. MCR recommends that the duties include:

- becoming the "expert" on the CARRS software,
- providing demonstrations and training to staff and users of the CARRS software,
- coordinating and supervising the maintenance process, and
- supervising catalog distribution.

B. QUARTERLY CATALOG MAINTENANCE

The Cost Center has decided that the catalog should be revised four times a year, at the end of each quarter. This will demonstrate to the participants and users that there is a bona fide commitment to keep this catalog current and responsive to the needs of the users. It will help keep the catalog visible and, in turn, will promote its use. A frequent revision policy provides the additional benefit of decreasing the number of revisions and additions made to the catalog at any one time. This will make the maintenance process less painful for all parties involved.

C. MANUAL REVISIONS TO THE CATALOG

At present, there is no facility in the CARRS software to allow for user revisions to the catalog and transfer of the revisions to the Cost Center's master catalog. For this reason, it was decided to disable the maintenance module in the software distributed to the participants to prevent the corruption of the catalog. The participants will, however, have the ability to create their own local data base to meet their individual requirements. Within their local system, they will have the ability to add and edit records, without affecting the master catalog. The Cost Center will be the only organization with the ability to make revisions to the catalog. Therefore, the Cost Center will become the clearinghouse for all revisions made to the master catalog and will become the distribution point for updated copies of the catalog.

This dictates the use of a manual procedure for catalog revisions. Hard copies of the catalog would be sent to the participants for corrections, deletions and additions. The catalog maintenance procedure can be organized along the following lines:

- The cost librarian distributes relevant sections of the printed catalog to the controlling activities' points of contact for their revisions and additions at the end of every quarter.
- The points of contact correct their section of the catalog and prepare a Data Collection Worksheet for every addition to the catalog. The corrections and additions are then returned to the Air Force Cost Center's cost librarian for processing.

- The cost librarian processes the revisions and additions and enters them into the catalog.
- Revised copies of the data bases are distributed to the participants.

This outline is the basis for the detailed maintenance procedures recommended in the next section, Section IV. Maintenance Procedures.

IV. MAINTENANCE PROCEDURES

Section III.C presented a general methodology for maintaining the catalog. In this section, that methodology is translated into a set of specific maintenance procedures which MCR recommends be used for revising the catalog. These procedures are the direct result of the experiences and techniques used in preparing this catalog. The procedures consist of five steps:

- prepare catalog revision package,
- distribute copies of revision package to DoD points of contact,
- process the additions and corrections to the catalog,
- revise maintenance lists, and
- distribute the revision to the participants.

In the following sections, we detail each of these steps. We also explain the data input formats and procedures. The flow of the revision process is pictured in Exhibit IV-1.

A. PREPARE CATALOG REVISION PACKAGE

The maintenance cycle begins by preparing the catalog revision package for distribution to the DoD points of contact. The revision package consists of:

- a transmittal letter,
- a current copy of the catalog records,
- copies of Resource Worksheets for additions, and
- a self-addressed mailing label.

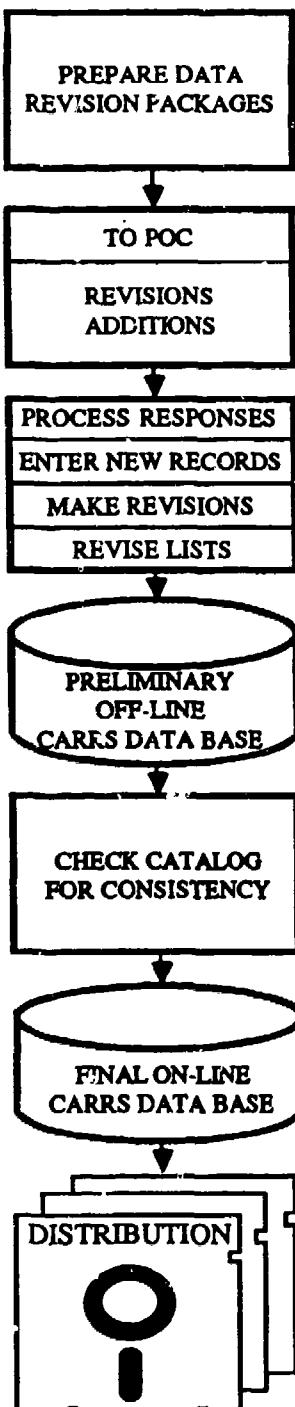


Exhibit IV-1. REVISION PROCESS

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the data elements and their descriptions and a current list of key words. The data element listing gives the analyst the detail necessary to make the corrections to existing catalog entries and acts as a guide for filling out the data collection Resource Worksheets for new additions. A return deadline date should be specified in the letter. A sample letter is included as Exhibit IV-2.

A current copy of the catalog is printed by "Controlling Activity" using the "Browse/Generate Reports" option of the CARRS software. The full records are printed and separated into individual sets by controlling activity using the current distribution list. The distribution list compiled during this effort is given in Appendix C.

Blank copies of the data collection Resource Worksheets (see Appendix B for samples) should be included for adding new cost tools. In addition, a self-addressed mailing label should be included with each revision package to ensure that the information is sent back to the Cost Center, in a timely manner.

B. DISTRIBUTE COPIES OF THE REVISION PACKAGE TO DoD POINTS OF CONTACT

The revision package is sent to all participating DoD organizations for their revisions and additions. At the same time, the product division's cost libraries should be contacted for a listing of any new additions received since the last update. The cost libraries at ASD and SD should be able to provide a computer listing of their new items. AD's cost library listing is also computerized, but it is not known if the

REPLY TO
ATTN OF: AFCCE (Cost Library)

TO:

SUBJ: Cost Model/Data Base Catalog Revision

1. The Air Force Cost Center maintains an automated catalog of the models and data bases being used for cost analysis within the Department of Defense (DoD), and provides this catalog of cost tools to Air Force and other cost analysts within DoD.
2. The Cost Center is now in the process of conducting its quarterly update of the catalog. Enclosed is a listing of the model/data base descriptions for your organization and worksheets for new additions.
3. We request that you review this listing for revisions and deletions. Please check each entry, especially the point of contact data, to make sure the information is correct. If revisions have been made to the cost tool, please describe these changes. If a record should be deleted from the catalog, include a short explanation why (e.g., superseded, not completed, not valid, etc.).
4. If you have additions to the catalog, please fill out a worksheet for each one. A list of key words by functional category as well as a description of the data elements are attached as an aid in completing these worksheets. Please describe the resource in as much detail as possible and generate a list of key words from the list provided. If new key words are needed, include them and they will be added to the list.
5. This revision is scheduled to be completed by the end of <month year>. To give us time to incorporate your changes and additions into the catalog, they must be received by our office no later than <date>. If no response is received by that date, your organization's listing will be included in the catalog in its present form. A self-addressed mailing label is included for your convenience in returning the revision.
6. We appreciate your cooperation in this effort. The revision of the catalog should be ready for distribution in <month>. You will be receiving your copy approximately <date>.

Exhibit IV-2. SAMPLE DATA REVISION PACKAGE TRANSMITTAL LETTER

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software they are using has this capability. The cost library at ESD is not automated and will have to supply a manual listing.

C. PROCESS THE ADDITIONS AND CORRECTIONS TO THE CATALOG

The processing of the catalog can be divided into three steps.

- Step 1: Prepare revisions and additions for catalog entry,
- Step 2: Enter changes into the catalog, and
- Step 3: Check entire catalog for consistency.

Each of these steps will be addressed in the following subsections.

1. Prepare Revisions and Additions for Catalog Entry

As revisions are received, the resource records should be processed to ensure consistency and validity of the information. First, check all responses for missing or confusing entries. A telephone call to the POC will clear up most problems. After any problems with the submitted data are resolved, the preparation of the data for entry into the catalog can begin. The amount and type of processing required for updates and additions are different. They will be handled separately in the next two subsections.

a. Revisions to Current Catalog Entries

Each correction to current entries must be checked for consistency and validity. Make sure that each change is a valid entry by using Exhibit IV-3, Valid Input Entries, included

<u>Field</u>	<u>Entry Options</u>
Resource Type (Entry Required)	M = Model D = Data Base
Security Classification (Entry Required)	U = Unclassified F = For Official Use Only (FOUO) C = Confidential S = Secret P = Proprietary
Resource Name (Entry Required)	Free-form Text (60 characters)
DoD Designation (Entry Required)	DoD Code (See list, Appendix C)
Controlling Activity	Organization/Office Code first, Full Name in parentheses
POC Title	Rank abbreviation, Mr., Ms., Dr., and/or First Name if it fits, else First Initial
POC Last Name	Free-form Text (20 characters)
Address	Three lines of free-form Text (45 characters each)
Resource Obtainable (Entry Required)	Y = Yes N = No C = Case by Case Basis U = Unknown
Call Number	Free-form Text (20 characters)
Resource Developer	Free-form Text (60 characters)
IOC Date	Month/Day/Year Month = 00 to 12 Day = 00 to 31
Date of Last Update	Month/Day/Year Month = 00 to 12 Day = 00 to 31

Exhibit IV-3. VALID INPUT ENTRIES

<u>Field</u>	<u>Entry Options</u>
Does Documentation Exist (Entry Required)	Y = Yes N = No U = Unknown
Document Title	Free-form Text (45 characters)
Document Available	Y = Yes N = No C = Case by Case Basis U = Unknown
Document Collected	Y = Yes N = No
Description of Resource	Five lines of free-form Text (60 characters each)
Special Features of Resource	Three lines of free-form Text (60 characters each)
Limitations of Resource	Three lines of free-form Text (60 characters each)
Automated (Entry Required)	Y = Yes N = No U = Unknown
Equipment Type	Free-form Text (30 characters)
Operating System	Free-form Text (30 characters)
Memory Requirements	Free-form Text (60 characters)
Programming Language	Free-form Text (40 characters)
Key Words	Key Code (see list, Appendix C)

Exhibit IV-3. VALID INPUT ENTRIES (CONT'D)

in this report. A list of consistency checks for each data item is given in Appendix E. Format each field in accordance with its consistency listing.

b. Additions to the Catalog

Check all prospective additions to make sure that they do not already exist in the catalog. Be aware that the titles of duplicate resources could vary. If there is any question, check the descriptions and/or call the POC for clarification. If the resource is not a duplicate, check that it meets the data collection criteria in Section II.A.4 of this final report.

If the addition meets all the requirements, the resource is ready to be transferred to a Data Entry Worksheet in preparation for entering it into the catalog. Use the data element descriptions (Exhibit IV-4), the consistency check list given in Appendix E, and the list of valid input entries (Exhibit IV-3) to transfer the information from the data collection Resource Worksheet to the Data Entry Worksheet. Most data items will transfer with no problem. However, there are three fields which have to be reduced and formatted for entry. They are the "Description", "Special Features", and "Limitations" fields. We suggest that an experienced cost analyst help with the content of these fields. The current catalog entries can be used as examples of ways to format the information into the space provided.

<u>Data Element</u>	<u>Definition</u>
ID Number	A system assigned number given sequentially to every model/data base entered into the system.
Resource Type	Model or Data base. If the resource is both, two entries should be made in the catalog, one for the model and one for the data base.
Resource Name	Common identifier given to the resource by the developer or controlling activity. If the name is an acronym, include both the acronym and full written title.
DoD Designation	Controlling Activity's DoD affiliation.
Security Classification	Unclassified, For Official Use Only, Confidential, Secret, or Proprietary.
Controlling Activity	Name of DoD organization presently using/maintaining resource. List organization/office code first, full name in parentheses.
Point of Contact	Name of individual within Controlling Activity responsible for resource. Enter title, first and last name.
Phone Number	Autovon or commercial number, with area code, of point of contact.
Mailing Address	Full mailing address of Point of Contact or Controlling Activity. Include office code (if needed) and zip code.

Exhibit IV-4. DATA ELEMENTS DESCRIPTION

MANAGEMENT CONSULTING & RESEARCH, INC.

<u>Data Element</u>	<u>Definition</u>
Resource Obtainable	Is the resource available to user's outside controlling activity. Yes, No, or Case by Case.
Call Number	DTIC, DLSIE, or local library reference number.
Resource Developer	Name of contractor or Government organization responsible for resource design and development.
Implementation Date	Approximate date development completed or system first operational, month/day/year.
Date of Last Update	Approximate date of last revision or update, month/day/year. If a revision is underway, fill in expected IOC.
Document Title	List the titles of all resource documentation.
Documentation Available	Indicates for each piece of documentation whether a copy may be obtained by another DoD organization or analyst.
Documentation Collected	Designates whether documentation was obtained under this survey effort.
Description/Uses	Up to five lines describing the resource so that a potential user can judge its appropriateness.
Special Features	Up to three lines describing any of the resource's special capabilities, e.g., graphics, special reports, etc.
Limitations	Up to three lines describing user-oriented restraints such as user fees and restrictions to resource availability, e.g., proprietary data. This area may also be used to describe any drawbacks or deficiencies in the resource.

Exhibit IV-4. DATA ELEMENTS DESCRIPTION (CONT'D)

MANAGEMENT CONSULTING & RESEARCH, INC.

<u>Data Element</u>	<u>Definition</u>
Resource Automated	Designates whether model/data base resides on computer system. Indicate yes, no, or unknown.
Equipment Type	If resource is automated, indicates the type of equipment, e.g., IBM PC/compatible, Z-100, VAX, etc.
Operating System	If resource is automated, indicates the operating system required to run the software.
Memory Requirements	If resource is automated, lists any memory requirements to run the package.
Programming Language	If resource is automated, indicates any language or compiler required to run software, e.g., dBase III, COBOL, FORTRAN.
Key Words (10)	Set of standard phrases which describe the model/data base and can be used as search criteria.

Exhibit IV-4. DATA ELEMENTS DESCRIPTION (CONT'D)

Generate a list of key words for this item using the list of key words provided in Appendix F and the "Description" and "Special Features" fields of the record. The number of key words that can be entered for any record is limited to ten. The assistance of an experienced cost analyst is advised for this task.

There are two points to be made concerning all the fields. First, use mixed case type (upper and lower case characters) when entering the information into the catalog. Second, use the full spelling. Do not use abbreviations by themselves unless absolutely necessary to fit the information into the space provided. If room is available, include both the full spelling and acronym whenever possible. A list of common abbreviations and acronyms which were used in the generation of this edition of the catalog is shown as Appendix E. If the need arises to use an abbreviation or acronym, check this list to see if a common abbreviation is listed for it. If it is listed, use this abbreviation for consistency. If an abbreviation is not listed, create a new one and add it to the list.

2. Enter Changes into the Catalog

It is recommended that a back up copy of the data base files be made before beginning the editing process. It is also a good practice to back up the data base files regularly during the editing process.

After the revisions have been verified, the changes may be entered using the "Edit Existing Record" and "Delete Existing Record" options in the Catalog Maintenance Menu in CARRS. When

transfer is complete, add new records using the "Enter New Record" option of the CARRS software. See the CARRS User's Manual for detailed information on how to use these options.

Different computers cannot be used simultaneously for portions of the update. At the end of the addition and editing routines, the CARRS software checks the record for errors in data entry before adding or changing the record in the data bases. The system also computes or modifies the identification number for the resource. If different computers are used during the entry process and the resulting data bases merged at the end of the revision cycle, the data bases will become hopelessly corrupted and the revision process will have to be started at the beginning using a back up copy of the catalog.

3. Check Entire Catalog for Consistency

After all revisions have been made to the catalog, the data base should be checked for overall consistency and validity. This important step ensures consistent search results and correct ordering during catalog browsing and report generation. These checks are performed using dBase III or dBase III+ software.

The general method is to index the data base on the field to be checked and then list out the data base. The indexing routine will sort the field in an order that can be easily checked for inconsistent results. Exhibit IV-5 provides a list of the consistency checks that should be performed on the data base files. It includes the dBase commands required to generate the data base listings necessary to the process. Use the consistency check list given in Appendix E as a guide to what

1. To Check Developer

Type:

```
USE DETAIL
INDEX ON DEVELOPP TO DEVTEMP
LIST FIELDS IDNUM, DEVELOPR TO PRINT
ERASE FILE DEVTEMP.NDX
```

2. To Check Controlling Activity

Type:

```
USE DETAIL
INDEX ON CONTROL TO CONTTEMP
LIST FIELDS IDNUM, CONTROL TO PRINT
ERASE FILE CONTTEMP.NDX
```

3. To Check Point of Contact's Name and Phone Number

Type:

```
USE DETAIL
INDEX ON POCLAST+POCTITLE TO POCTEMP
LIST FIELDS IDNUM, POCLAST, POCTITLE, PHONE TO PRINT
ERASE FILE POCTEMP.NDX
```

4. To Check Controlling Activity's Address

Type:

```
USE DETAIL
INDEX ON ADDRESS1+ADDRESS2+ADDRESS3 TO ADDTEMP
LIST FIELDS IDNUM, ADDRESS1, ADDRESS2, ADDRESS3 TO PRINT
ERASE FILE ADDTEMP.NDX
```

5. To Check Automation Field for Equipment

Type:

```
USE DETAIL
INDEX ON EQUIPMENT TO EQTEMP
LIST FIELDS IDNUM, EQUIPMENT TO PRINT
ERASE FILE EQTEMP.NDX
```

6. To Check Automation Field for Operating System

Type:

```
USE DETAIL
INDEX ON OPERSYS TO OPTEMP
LIST FIELDS IDNUM, OPERSYS TO PRINT
ERASE FILE OPTEMP.NDX
```

Exhibit IV-5. CONSISTENCY ROUTINES

MANAGEMENT CONSULTING & RESEARCH, INC.

7. To Check Automation Field for Memory Requirements

Type:

```
USE DETAIL
INDEX ON MEMORY TO MEMTEMP
LIST FIELDS IDNUM,MEMORY TO PRINT
ERASE FILE MEMTEMP.NDX
```

8. To Check Automation Field for Programming Language

Type:

```
USE DETAIL
INDEX ON LANGUAGE TO LNGTEMP
LIST FIELDS IDNUM,LANGUAGE TO PRINT
ERASE FILE LNGTEMP.NDX
```

Exhibit IV-5. CONSISTENCY ROUTINES (CONT'D)

MANAGEMENT CONSULTING & RESEARCH, INC.

should be checked in each field. Changes may be marked on the listings but corrections should be made only through the CARRS software using the "Edit Existing Record" option. The "IDNUM" field of each listing contains the identification number to enter to retrieve the record for editing.

After all consistency revisions have been made, a draft copy of the catalog should be printed. One last check of the catalog should be made using this draft before the final printing of the catalog is made and the disks are prepared for distribution.

D. REVISE MAINTENANCE LISTS

A number of listings, which have been designed to help with the maintenance process, have been furnished for the current catalog. They include:

- a data elements description list (Exhibit IV-4),
- a catalog distribution list (Appendix C),
- a consistency check list (Appendix E),
- consistency listings for controlling activities, POC addresses, and automation field types (Appendix E),
- an acronym list (Appendix F), and
- a key word list (Appendix F).

The data item descriptions define the content of every field in the catalog and are software dependent. For this reason, they should rarely change without a redefinition of the catalog purpose or modification of the CARRS software. However, the three fields, "Description", "Special Features" and "Limitations", are text fields and their content is subject to

redefinition. Caution is advised if a change in the definitions is being considered. Redefinition affects the content of all previous data entered in the catalog and these records will have to be revised to reflect any changes that are made to ensure consistency in the catalog. If a change is made, this list should be corrected to reflect those changes before the beginning of every revision cycle.

The catalog distribution list (Appendix C) specifies the primary points of contact within the DoD organizations surveyed. These POCs will act as the central point within their organization for all revisions and revised catalog distributions. Because of their prominent role in the upkeep of the catalog, it is important that the list be kept up-to-date at all times.

The consistency listings (Appendix E) and the key word and acronym lists (Appendix F) were generated during this effort's consistency and validation procedures. They are the key to a usable catalog. As new additions and revisions are made to the catalog, these lists should be revised and new key words, acronyms and consistency items added to the list.

E. DISTRIBUTE THE REVISION TO THE PARTICIPANTS

After completion of the catalog maintenance process, change the date in the "Setup" data base to reflect the date of this revision. This is done using dBASE III or dBASE III+. See Exhibit IV-6 for the procedure, including the dBASE commands, to change the date. Back up the data base files using the CARRS software option.

- STEP 1: Within dBase, type USE SETUP, then press <CR> to select the data base
- STEP 2: Type GO TOP, then press <CR> to go to top of file
- STEP 3: Type EDIT, then press <CR> to display the record to edit
- STEP 4: Use cursor keys or <CR> to move to "REVDATE" field
- STEP 5: Enter new date (in the form: month/day/year) by typing over the old date
- STEP 6: Type <CTRL> and "W" simultaneously to save changes or type <ESC> to abort changes

Exhibit IV-6. CHANGE REVISION DATE PROCEDURES

Using the DOS "Copy" command, copy the data base files to floppy diskettes from the hard drive. This version of the catalog requires two diskettes for every distribution copy of CARRS to hold all of the data base files. As the catalog expands, more diskettes may be required. Each future distribution copy must have the following files:

- MLIMIT.DBF,
- MKEYW.DBF,
- MSERVA.DBF,
- MDESCRIP.DBF,
- MDOCUM.DBF,
- MDETAIL.DBF,
- MFEAT.DBF, and
- MKEYA.DBF.

The first distribution of the catalog requires additional files which have been supplied to AFCCE by MCR. These files configure the initial system and give the user the ability to maintain a local data base. These additional files must not be included in subsequent catalog revisions.

Some experimentation may be necessary to find the most economical way of copying the files to diskettes. Each double sided double density (DSDD) diskette holds 362,496 bytes of information. Type DIR *.DBF, and a <CR> to display the data base files and the number of bytes in each one. Use this as a guide to copying the files to fill the diskettes.

Use these diskettes as masters and duplicate them using a double floppy diskette computer. To copy the diskettes from one drive to the other, follow this procedure:

- Step 1: Using the DOS "Format" command, format the number of disks required for the distribution—the number of data base diskettes multiplied by the number on the distribution list;
- Step 2: Put the master diskette into the A drive and a blank formatted diskette in the B drive;
- Step 3: Type COPY A:.* B:, then type <CR>; and
- Step 4: After the copy operation is complete, insert the next master diskette in the A drive and a blank formatted diskette in the B drive, and type the command in Step 3 above.

Repeat these steps until the set of data base diskettes is complete. Repeat all the above steps for each distribution copy. As an alternative to this procedure, make all distribution copies of the first master diskette, then all distribution copies of the second diskette, etc., until all master diskettes have been duplicated.

V. OBSERVATIONS AND CONCLUSIONS

Because of our considerable data collection experience, we were aware of the problems that usually arise when surveying by mail (e.g., low response rates and incomplete/inconsistent responses). To avoid these problems, personal interviews and briefings were conducted. To obtain the amount of detailed information we were collecting, we completed the forms ourselves, using available documentation. Being able to offer the catalog and CARRS software to all survey participants was an excellent incentive for cooperation.

This effort did encounter some unforeseen problems. First, the initial survey responses received from the Air Force and Navy included only automated cost tools and they were almost entirely composed of models. We compensated by collecting non-automated models and data bases through the cost libraries established within the Air Force product divisions.

Second, we encountered some reluctance from analysts to being referenced as a point of contact for a model/data base in the catalog. These points of contact envisioned a prohibitive amount of phone inquiries and requests for copies. We tried to overcome this by explaining that the detailed information we were collecting on each cost tool and the sophisticated search routines within the CARRS software would reduce the burden of unnecessary calls. It should be recognized that many of the offices are not staffed to respond to a large number of requests for copies of these tools. This should be stressed during the

planned demonstrations. Analysts should be sure that a tool will meet a real estimating requirement.

Third, quite a few analysts insisted on completing the detailed data collection forms themselves. However, MCR had great difficulty in getting the forms filled out and sent back in time for us to process. We found that once the analyst realized the amount of information required to fill out the form, his busy schedule did not allow him time to complete them. Of the ones that were received, all were lacking the detail necessary to adequately describe the tools and usually consisted of one line descriptions. We were able to counteract this by collecting the additional information directly over the phone or from the cost libraries.

In summary, we were able to resolve all of the difficulties encountered in the performance of this effort. We were able to develop a useful catalog of 341 major DoD cost tools as well as a versatile cataloging system which will aid in the growth, maintenance and use of this important cost analysis resource.

Although an attempt was made to survey all of the major Air Force cost analysis organizations and as many other DoD components as possible, some activities were unavoidably missed. The Army Materiel Command did not participate in the survey, severely limiting our coverage of the Army.

In addition, some models/data bases were unavailable at the time of the initial survey. We canvassed our primary points of contact for additional areas to investigate. Any recommendations they had were limited by their background, experience and

corporate memory. It is hoped that once the catalog has proven its value, other sources will be identified and their models and data bases will be added.

APPENDIX A
INITIAL SURVEY FORM AND TRANSMITTAL LETTERS

This appendix contains copies of the letters and initial survey form used in this effort. Included are the:

- initial survey transmittal letter,
- initial survey form, and
- catalog verification transmittal letter and attachments.



HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, D.C. 20330-5018

22 DEC 1986

ACC

Cost Model/Data Base Catalog

1. The Air Force Cost Center (APCCE) is developing a catalog of the cost models and data bases used for cost analysis within the DoD. The goal of this effort is to encourage sharing of existing tools, development of new tools where necessary, and coordination of research efforts.
2. The Air Force Cost Center has contracted with Management Consulting & Research, Inc., (MCR) to survey various organizations within DoD and compile descriptive information on the models and data bases being used for cost analysis. In order to facilitate the storage and retrieval of the survey information, MCR is also providing an automated cataloging system designed to run on microcomputers.
3. We are soliciting your participation in this effort. If you or your organization uses or has used models or data bases for cost analysis, please complete and return the attached short survey form to MCR in the enclosed self-addressed envelope. The survey encompasses all areas of cost analysis including:
 - life cycle, development, production and O&S costs
 - CER development
 - learning curve analysis and
 - cost/schedule assessmentMCR will not be collecting the actual data bases/models, only collecting information about them. All information that you consider proprietary will be protected and so marked. In addition, this catalog will be made available only to personnel within DoD. A list of the data being collected is attached.
4. The results of this study including the menu-driven cataloging and retrieval system will be provided to all participants upon request. The automated system is designed to run on IBM-PC or compatible computers. Additional information can be obtained from MCR.

5. If your participation in this initial canvassing indicates that you or your organization are using estimating resources of interest to this study, you and/or your designated point of contact will be contacted to arrange a suitable time to discuss this resource in more detail. If you know of any other individuals within or outside of your organization who use cost analysis tools that should be included in this survey, please forward them a copy of this letter or give this information to MCR when you are contacted.

6. Mr Bernard Fox or Ms Patricia Yee from MCR will be in touch with you shortly. However, if you have questions concerning this survey, you may contact the project's COTR, Lt Col Peter Beck, AFCCE, at (202) 697-0722 AV 227-0722 or MCR at (703) 820-4600.

7. Your reply is requested not later than 30 January 1987 to meet contract schedule requirements. Phone contacts to those asked to participate further will be scheduled for February 1987. These contacts will serve to deveiop detailed model and database descriptions.

8. We appreciate your cooperation in this important effort.



LERoy T. BORENSON
Associate Director
Program Analysis
FACCE

1 Atch
Cost Model Survey

**HQ USAF/ACC
COST MODEL/DATA BASE SURVEY**

Please list your name, title, organization, and phone number:

Name: _____ Title: _____

Organization: _____ Phone No.: _____

Number of Models/Data Bases Used: _____

If your organization uses or has used any data bases and/or models to do cost analysis, please answer the following questions for each cost analysis tool. Space has been provided for five (5) tools. If more space is required, please use additional sheets.

Data Base

Model

Title: _____

Brief Description: _____

List the person who is best qualified to discuss this resource in detail. Please provide a commercial phone number if possible.

Name: _____ Title: _____

Organization: _____ Phone No.: _____

Data Base

Model

Title: _____

Brief Description: _____

List the person who is best qualified to discuss this resource in detail. Please provide a commercial phone number if possible.

Name: _____ Title: _____

Organization: _____ Phone No.: _____

Data Base

Model

Title: _____

Brief Description: _____

List the person who is best qualified to discuss this resource in detail. Please provide a commercial phone number if possible.

Name: _____ Title: _____

Organization: _____ Phone No.: _____

Data Base

Model

Title: _____

Brief Description: _____

List the person who is best qualified to discuss this resource in detail. Please provide a commercial phone number if possible.

Name: _____ Title: _____

Organization: _____ Phone No.: _____

Data Base

Model

Title: _____

Brief Description: _____

List the person who is best qualified to discuss this resource in detail. Please provide a commercial phone number if possible.

Name: _____ Title: _____

Organization: _____ Phone No.: _____



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, D.C. 20330

REPLY TO
ATTN OF: AFCCE

TO:

SUBJ: Cost Model/Data Base Catalog

1. The Air Force Cost Center is conducting a project to survey the models and data bases being used for cost analysis within the Department of Defense (DoD) and to provide an automated catalog of these tools for use by Air Force and other cost analysts within DoD.
2. Management Consulting & Research, Inc. (MCR) is now in the process of completing the initial cataloging phase of this effort. Enclosed is a listing of the model/data base descriptions collected from various sources for your organization. We request that you take this opportunity to review these worksheets before final release.
3. There are two groups of worksheets within the review copy enclosed. The first group represents the resources that were collected based on your initial survey response. Please check these to make sure the information is correct. Any additional relevant information which you could provide would also be appreciated. Feel free to make any necessary changes to the record including suggesting any relevant keywords. A list of keywords by functional category as well as a description of the data elements is attached as an aid in completing these worksheets. The second group of worksheets are resources identified from the product division cost libraries in which your organization was indicated as controlling activity. We would appreciate it if you could indicate whether these resources should be included in the catalog and fill in as much of the missing information as possible. If it should not be catalogued, please include a short explanation why (e.g., superseded, not completed, not valid, etc.) for the record.
4. This phase of the effort is scheduled to end the 30th of September. To give MCR time to incorporate your changes into the catalog, they must receive your response no later than 15 September. If no response is received by that date, the worksheets will be included in the catalog in their present form. A self-addressed mailing label is included for your convenience in returning them directly to MCR.

5. I would like to take this opportunity to thank you and your staff for your assistance in this effort. We are now in the process of planning the catalog distribution. You will be receiving your copy of the automated catalog approximately 31 October.

Enclosures

KEY WORD LIST BY FUNCTIONAL CATEGORY

A. Purpose/Objective

Cost Estimates/Analyses
Cost/Benefit Analysis
Data Base
Decision Support Systems
Economic Analysis
Financial Analysis
Manpower Estimates/Analyses
Performance Assessments
Planning/Programming/Budgeting
Program Analysis
Requirements Estimates/Analyses
Risk Analysis
Schedule Estimates/Analyses
Software Sizing

B. Costs Covered

Concept Definition Costs
Construction Costs
Development Costs
First Destination Transportation Costs
Indirect Costs
Lease Costs
Life Cycle Costs (LCC)
Modification Costs
Operating & Support (O&S) Costs
Production Costs
Warranty Costs

C. Type of Data

Cost Data
Equipment Hour Data
Labor Hour Data
Manpower Data
Program Data
Schedule Data
Technical Characteristics Data

D. Analysis Techniques

Analog Techniques
Contract Analysis
Contractor Cost Data Report (CCDR) Analysis
Contractor Performance Report (CPR) Analysis
Cost/Schedule Status Report (C/SSR) Analysis
Curve Fitting
Econometric Forecasting
Engineering Buildup Techniques
Monte Carlo Simulation
Parametric Techniques
Selected Acquisition Report (SAR) Analysis
Statistical Analysis

E. Relationships

Cost Estimating Relationships (CERs)
Cost Factors
Escalation Factors
Escalation Indices
Learning Curves
Manpower Estimating Relationships (MERs)
Planning Factors
Schedule Estimating Relationships (SERs)
Weight Estimating Relationships (WERs)

F. Work Breakdown Structure

Cost of Money (COM)
Engineering
Engineering Change Orders (ECO)
Facilities
Flyaway
Forces
Functional Breakdown
Government Furnished Equipment (GFE)
Installation
Integrated Logistic Support (ILS)
Labor/Materials Breakdown
Maintenance
Management Reserve
Manufacturing
Markup
Nonrecurring/Recurring Breakdown
Overhead
Peculiar Support Equipment (PSE)
Primary Resource Breakdown
Prime Mission Equipment (PME)
Procurement Support
Profit

Site Activation
Spares
SWBS Weight Groups
Test & Evaluation
Tooling & Test Equipment
Weapon Systems

G. Equipment Covered

ADP
Aircraft
Aircraft (Airframe)
Aircraft (Engines)
Aircraft (Modifications)
Aircraft (RPV)
Armament
Avionics
Command & Control Systems
Communications
Composites
Electronics
Electronics (Electro-Optical)
Electronics (Electronic Warfare)
Electronics (Identification)
Electronics (Laser)
Electronics (Navigation)
Electronics (Night-Vision)
Electronics (Radar)
Electronics (Sensor)
Electronics (Sonar)
Missiles (Strategic)
Missiles (Tactical)
Munitions
Precision-Guided Submunitions
Satellite Earth Stations
Ships
Software
Software (Embedded)
Space Systems
Space Systems (Spacecraft)
Vehicles
Vehicles (Tracked)
Vehicles (Wheeled)

DATA ELEMENT DESCRIPTIONS

<u>Field</u>	<u>Entry Options</u>
Resource Type	Model or Data base. If the resource is both, two entries have been made in the catalog, one for the model and one for the data base. If your resource should be split, make a copy of the sheet and mark the appropriate entries in each one.
Resource Name	Common identifier given to the resource by the developer or controlling activity. If the name is an acronym, include both the acronym & full written title.
DoD Designation	Controlling Activity's DoD affiliation.
Security Classification	Unclassified, For Official Use Only, Confidential, Secret, or Proprietary.
Controlling Activity	Name of DoD organization presently using/maintaining resource. List organization/office code first, full name in parentheses.
Point of Contact	Name of individual within controlling activity responsible for resource. Please supply title, first and last name.
Phone No.	Autovon or commercial number, with area code, of point of contact.
Mailing Address	Full mailing address of Point of Contact or Controlling Activity. Please include office code (if needed) and zip code.
Resource Obtainable	Is the resource available to user's outside controlling activity. Yes, No, or Case by Case.
Call Number	DTIC, DLSIE, or local library reference number.
Resource Developer	Name of contractor or Government

	organization responsible for resource design and development.
Implementation Date	Approximate date development completed or system first operational, month/day/year.
Date of Last Update	Approximate date of last revision or update, month/day/year. If a revision is underway, fill in expected IOC.
Document Title	List the titles of all resource documentation.
Documentation Available	Indicate for each piece of documentation whether a copy may be obtained by another DoD organization or analyst.
Description/Uses	Briefly Describe the resource so that a potential user can judge its appropriateness. Use the keyword listing categories for subjects to cover in the description.
Special Features	Use this area to describe any of the resource's special capabilities, e.g., graphics, special reports, etc.
Limitations	List any user-oriented restraints such as user fees and restrictions to resource availability, e.g., proprietary data. This area may also be used to describe any drawbacks or deficiencies in the resource.
Automated	Please indicate whether resource is automated, yes or no.
Equipment	If resource is automated, indicate the type of equipment, e.g., IBM PC/compatible, Z-100, AX, etc.
Operating System	If resource is automated, indicate what operating system required to run the software.

Memory Requirements

If resource is automated, list any memory requirements to run the package.

Programming Language

If resource is automated, indicate any language or compiler required to run software.

APPENDIX B
DATA COLLECTION AND ENTRY WORKSHEETS

AIR FORCE
COST MODEL/DATABASE CATALOG
RESOURCE WORKSHEET

Data Base

Model Security Classification (U,P,C,S): _____

Title: _____

Controlling Activity: _____

Point of Contact: _____

Phone Number: (_____) _____

Mailing address: _____

Resource Obtainable (Y/N): Applicable Call Number: _____

Resource Developer: _____

Implementation Date: Date of Last Update: _____

Description/Uses: _____

Special Features: _____

Limitations: _____

(user costs, _____

upgrades) _____

DOCUMENTATION

Does documentation Exist? (Y/N) _____

Document Title	Available	Collected

AUTOMATION

Automated (Y/N)? _____

Equipment: _____

Operating System: _____

Memory Requirements: _____

Programming Language: _____

ADDITIONAL COMMENTS:

AIR FORCE
COST MODEL DATA BASE CATALOG
DATA ENTRY WORKSHEET

ID Number:	Resource Type (M,D): <input type="text"/>	Security Classification (U,C,S,P): <input type="text"/>
Resource Name: <input type="text"/>	Resource Name: <input type="text"/>	
DOD Designation (e.g. F.A.N.M.): <input type="text"/>	Controlling Activity: <input type="text"/>	
POINT OF CONTACT		
Title: <input type="text"/>	Last Name: <input type="text"/>	Call Number: <input type="text"/>
Phone Number: <input type="text"/>	Address: <input type="text"/>	
Resource Obtainable (Y,C,N,U): <input type="text"/>		

**AIR FORCE
COST MODEL DATA BASE CATALOG
DATA ENTRY WORKSHEET**

Resource Developer: _____

IOC Date: 11/11/11

Date of Last Update: / /

Does Documentation Exist? (Y/N/U):

**COST MODEL/ DATA BASE CATALOG
DATA ENTRY WORKSHEET**

AIR FORCE
COST MODEL/ DATA BASE CATALOG
DATA ENTRY WORKSHEET

Automated (Y,N,U): <input type="checkbox"/>	Equipment Type: <input type="checkbox"/>
Operating System: <input type="checkbox"/>	Memory Requirements: <input type="checkbox"/>
Programming Language: <input type="checkbox"/>	
Key Words:	
1. <input type="checkbox"/>	2. <input type="checkbox"/>
6. <input type="checkbox"/>	7. <input type="checkbox"/>
8. <input type="checkbox"/>	9. <input type="checkbox"/>
4. <input type="checkbox"/>	5. <input type="checkbox"/>
10. <input type="checkbox"/>	

APPENDIX C
CATALOG DISTRIBUTION LIST

CARRS PRIMARY DISTRIBUTION POCS AND ADDRESSES

1. Electronic Systems Division

Captain Joe Dean
HQ ESD/ACCR
Hanscom Air Force Base
Hanscom, Massachusetts 01731-5000
(617) 377-2679

2. Armament Division

Mr. Wayne L. Foster
Department of the Air Force
Armament Division/ACCI
Eglin Air Force Base, Florida 32542-5260
(904) 882-2126

3. Space Division

Captain Blaine F. Webber
Los Angeles Air Force Station
HQ Space Division/ACCR
P.O. Box 92960
Los Angeles, California 90009-2460
(AV) 833-1772

4. Air Force Logistics Command

Mr. Steve Klipfel
Department of the Air Force
HQ AFLC/ACCCE
Wright-Patterson AFB, Ohio 45433-6503
(AV) 787-3920

5. Naval Air Systems Command

Mr. James Weathersbee
Naval Air Systems Command, AIR-524
1421 Jefferson Davis Highway
Jefferson Plaza No. 2
Arlington, Virginia 20361
(202) 692-3836

6. Naval Center for Cost Analysis

Dr. Dan Nussbaum
Naval Center for Cost Analysis
The Pentagon, Room 4A522
Washington, D.C. 20350-1100
(202) 746-2327

7. Air Force Engineering and Services Center

Mr. Mike Pryor
Department of the Air Force
HQ AFESC/DEC, Stop 21
Tyndall Air Force Base, Florida 32403-6001
(AV) 970-6230

8. Air Force Systems Command

Mr. John Burke
HQ AFSC/ACCE
Andrews Air Force Base
Washington, D.C. 20334-5000
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9. Defense Communications Agency

Mr. Rich Brannon
Defense Communications Agency
Cost and Program Analysis, Code H610
Washington, D.C. 20305-2000
(AV) 222-2923

10. Cost and Economic Analysis Center

Mr. Merv Franz
USACEAC
1900 Half Street, S.W.
Washington, D.C. 20324-2300
(202) 475-1016

11. Ballistic Missile Office

Mr. David Hansen
Department of the Air Force
HQ Ballistic Missile Office/ACC
Norton Air Force Base, California 94209-6468
(AV) 876-2118

12. Naval Sea Systems Command

Mr. Scott Sutton
Department of the Navy, SEA-017E
Naval Sea Systems Command
Washington, D.C. 20362-5101
(202) 692-1679

13. SDIO

Mr. James Dryden
SDIO, System Engineering S/SE
The Pentagon
Washington, D.C. 20301-7100
(202) 693-1824

14. Office of the Secretary of Defense

LTC Michael McLendon
OSD/PA&E
The Pentagon, Room 2D278
Washington, D.C. 20301-1800
(202) 697-4311

15. Defense Logistics Agency

Mr. Ted Ingalls
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16. Space and Naval Warfare Systems Command

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2511 Jefferson Davis Highway (NC-1)
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17. Air Force Acquisition Logistics Center

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(513) 255-5146

18. Aeronautical Systems Division

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Wright-Patterson AFB, Ohio 45433-6503
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19. Naval Weapons Center

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China Lake, California 93555-6001
(619) 939-2938

20. Aeronautical Systems Division

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APPENDIX D
COST ANALYSIS TOOLS

APPENDIX E
LIST OF CONSISTENCY CHECKS

CHECKLIST FOR CONSISTENCY

Resource Type:

- If a model includes a data base, create a record for each, and cross-reference them by I.D. Numbers in the Special Features field.

Resource Name:

- Put any acronyms of models and data bases first, followed by full title in parentheses.

Example: IRLA (Item Repair Level Analysis)

Controlling Activity:

- Spell out acronyms of DoD organizations, if possible. Begin with the acronym, if one exists, and follow with the complete spelling in parentheses.

Example: ASD/ACCI (Aeronautical Systems Division)

- See list of Controlling Activities and their addresses included in this appendix.

Point of Contact:

- For POC Title, use rank abbreviation, Mr., Ms., Dr., (if known) and first name. Use first initial if first name is too long or unknown.
- Use "Unknown" if the name of the POC is not available.
- If the POC is unknown or the POC listed was obtained from outdated information, then the limitations section should read, "Current POC unknown."
- If the POC listed is a librarian contacted for information, the limitations section should read, for example, "POC listed is ESD Cost Librarian."
- See the list of POC names and addresses included in this appendix.

Document Title:

- If the documentation title takes up more than one line, continue onto the next line, indenting one space.
- Abbreviation for a particular volume of documentation: Vol. I, Vol. II, etc.

POC Phone Number:

- Begin with the area code or autovon abbreviation in parentheses, followed by the number.
- Use an Autovon number, if available.

Example: (AV) 227-0317
(202) 433-4084

POC Address:

- Use "Unknown" if the address is not available.
- Pentagon Zip Codes:
20301 - Department of Defense
20310 - Army
20330 - Air Force
20350 - Navy
- Use "DC" instead of "D.C."
- Use "HQ" for headquarters.
- See POC address list, included in this appendix, for more information.

Call Number:

- Enter the library name acronym (e.g., ASD, SD, AD, DTIC, DLSIE), a space, and then the catalog number.

Resource Developer:

- For Government organizations, list the acronym first followed by the full spelling in parentheses.
- For private companies, spell out the company name before company abbreviations in parentheses.
- If there is more than one developer, separate them by a semicolon (;).

Date:

- Leave date blank if unknown. "N/A" is the default and will show up in the reports.
- IOC Date must be less than Date of Last Update.
- If month or day is unknown, insert zeros.

Description, Special Features or Limitations:

- Single space between sentences & after colons.
- Use "&" instead of "and" if necessary to fit in text.
- Make sentences shorter by eliminating unnecessary articles, prepositions, verbs, etc... if more room is needed.
- For important phrases that someone would be likely to search on, try to include both the full spelling and the common abbreviation in the text.

Example: Life Cycle Costs (LCC).
- For abbreviations or acronyms that cannot be spelled out in the text, add a definition to the acronym lists.
- Do not insert periods in abbreviations such as Washington, DC, US.
- Capitalize names of other cost models or data bases.
- Refer to a particular fiscal year as follows: FY75, FY81, etc.

Description:

- Use "Unknown." if no description is available.

Special Features:

- Use "Unknown." if no special features are known.

Limitations:

- Make sure SECRET, CONFIDENTIAL and For Official Use Only documents are noted in the limitations section.
- If resource availability is unknown, then it should say so in the limitations.
Example: "Model availability unknown."
- If documentation was found in a cost library, limitations should read "Documentation available through..."
- If POC listed is a librarian, limitations should include statement "POC listed is ESD Cost Librarian."
- If POC listed is unknown or outdated, limitations should include statement "Current POC unknown."
- Use "Unknown." if information on limitations is not available.

Automation:

- Use "Unknown" if resource automation is not known.
- See automation consistency list in this appendix for more information.

For Consistency:

- "Life Cycle Cost" not Life-Cycle cost.
- No periods in US.
- Trade-off has a hyphen.
- User's has an apostrophe.
- Etc... is spelled "etc."
- "CERs" not CER's.
- RCA PRICE is capitalized.

CONTROLLING ACTIVITY ADDRESSES

1. AD (Armament Division)

Department of the Air Force
Armament Division/(subdiv code)
Eglin Air Force Base, Florida 32542-5260

2. AF/ACCC (US Air Force Cost Programs Division)

HQ USAF/ACCC
The Pentagon, Room 4D184
Washington, D.C. 20330

3. AF/RDQ (Direct. of Operational Requirements)

Department of the Air Force
AF/RDQ, The Pentagon
Washington, D.C. 20330

4. AFALC (AF Acquisition Logistics Center)

Department of the Air Force
AFALC/(subdiv code)
Wright-Patterson AFB, Ohio 45433-6503

5. AFCAC/AV (Air Force Computer Acquisition Center)

AFCAC/AV
Hanscom Air Force Base
Hanscom, Massachusetts 01731-5000

6. AFCMD/SA (Air Force Contract Management Division)

Department of the Air Force
AFCMD/SA
Kirtland Air Force Base, New Mexico 87117-5000

7. AFESC/DEC (Engineering & Services Center)

Department of the Air Force
HQ AFESC/DEC, Stop 21
Tyndall Air Force Base, Florida 32403-6001

8. AFHRL (AF Human Resources Laboratory)

Department of the Air Force
AFHRL/{subdiv code}
Wright-Patterson AFB, Ohio 45433-6503

9. AFLC (Air Force Logistics Command)

Department of the Air Force
HQ AFLC/{subdiv code}
Wright-Patterson AFB, Ohio 45433-6503

10. AFSC/ACC (Air Force Systems Command)

HQ AFSC/ACC
Andrews Air Force Base
Washington, D.C. 20334-5000

11. AFWAL/AA... (Avionics Laboratory)

Department of the Air Force
AFWAL/{subdiv code}
Wright-Patterson AFB, Ohio 45433-6503

12. AFWAL/FI... (Flight Dynamics Laboratory)

Department of the Air Force
AFWAL/{subdiv code}
Wright-Patterson AFB, Ohio 45433-6503

13. AFWL (Air Force Weapons Laboratory)

Department of the Air Force
Air Force Weapons Laboratory
Kirtland Air Force Base, New Mexico 87117-5000

14. AGMC (Aerospace Guidance & Metrology Center)

Aerospace Guidance & Metrology Center
Newark Air Force Station, Plans & Program Office
Newark, Ohio 43057

JSDE/IS (Joint Services Data Exchange Group)
Aerospace Guidance & Metrology Center
Plans and Program Office
Newark Air Force Station, Ohio 43055

15. AMRAAM Joint System Program Office

AMRAAM Joint System Program Office
Armament Division
Eglin Air Force Base, Florida 32542-5260

16. ASA (RDA) (Assistant Secretary of the Army)

Deputy for Management and Budget, ASA (RDA)
The Pentagon, Room 2E673
Washington, D.C. 20301

17. ASD (Aeronautical Systems Division)

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ASD/(subdiv code)
Wright-Patterson AFB, Ohio 45433-6503

18. AVSCOM (U.S. Army Aviation Systems Command)

USAAVSCOM, Cost Analysis Division
P.O. Box 209 (Estimates & Studies Branch)
St. Louis, Missouri 63166

USAAVSCOM, Directorate for Plans & Analysis
4300 Goodfellow Blvd. (Data Analysis & Control)
St. Louis, Missouri 63120

USAAVSCOM/DRDAV-BA
4300 Goodfellow Blvd.
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19. BMO (Ballistic Missile Office)

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Norton Air Force Base, California 92409-6468

20. CEAC (Cost & Economic Analysis Center)

USACEAC (Attn: CACC-VE)
1900 Half Street, S.W.
Washington, D.C. 20324-2300

USACEAC
1900 Half Street, S.W.
Room 7331
Washington, D.C. 20324-2300

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24. DCA (Defense Communications Agency)
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Cost and Program Analysis Branch, Code H610
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25. DCEC (Defense Communications Engineering Center)
Defense Communications Engineering Center
1860 Wiehle Ave., Dery Engineering Bldg.
Reston, Virginia 22090
26. DLA (Defense Logistics Agency)
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27. Decision-Science Applications, Inc.
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1901 North Moore Street, Suite 1000
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28. Directorate of Operational Requirements
Directorate of Operational Requirements
Deputy Chief of Staff
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29. EDDINS-EARLES

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HQ ESD
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Hanscom, Massachusetts 01731-5000

ESD/SC5-3 (SACDIN Program Office)
Hanscom Air Force Base
Hanscom, Massachusetts 01731-5000

HQ ESD
SEEK TALK System Program Office
Hanscom Air Force Base
Hanscom, Massachusetts 01731-5000

ESD/XRSE (Software Design Center)
Deputy for Development Plans & Support Systems
Hanscom Air Force Base
Hanscom, Massachusetts 01731-5000

31. WANG Institute of Graduate Studies (WICOMO Model)

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Tyngsboro, Massachusetts 01879

32. JTCO (Joint Tactical Communications Office)

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Joint Tactical Communications Office
Ft. Monmouth, New Jersey 07703-5000

Joint Tactical Communications Office
Operational Research Division
Ft. Monmouth, New Jersey 07703-5000

33. MCDEC (Marine Corps Development and Educational Command)

Marine Corps Development and Educational Command
DL/S Plans, Development Center
Quantico Marine Corps Base, Virginia 22134

34. NADC (Naval Air Development Center)

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Warminster, Pennsylvania 18374

35. NAMO-24 (Naval Air Maintenance Organization)

Naval Air Maintenance Organization (NAMO-24)
Patuxent River Naval Annex
Patuxent, Maryland 20670-5449

36. NAVAIR (Naval Air Systems Command)

Naval Air Systems Command (subdiv code)
1421 Jefferson Davis Highway
Jefferson Plaza No. 2
Arlington, Virginia 20361

37. NAVSEA (Naval Sea Systems Command)

Department of the Navy
Naval Sea Systems Command, (subdiv name)
Washington, D.C. 20362-5101

38. NAVWESA (Naval Weapons Engineering Support Activity)

Naval Weapons Engineering Support Activity
Washington Navy Yard, Building 220
Washington, DC 20003

39. NCA (Naval Center for Cost Analysis)

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The Pentagon, Room 4A522
Washington, D.C. 20350-1100

40. NMC (Naval Missile Center)

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Point Mugu, California 93042

41. **NPRDC (Navy Personnel R&D Center)**

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Navy Personnel Research and Development Center
San Diego, California 92152

42. **NSWC (Naval Surface Weapons Center)**

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Naval Surface Weapons Center
Dahlgren, Virginia 22448

Naval Surface Weapons Center
White Oak Laboratory
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2067 Massachusetts Ave.
Cambridge, Massachusetts 02140

58. TACOM (U.S. Army Tank-Automotive Command)

U.S. Army Tank Automotive Command
ATTN: AMSTA-VC
Warren, Michigan 48397-5000

59. TRADOC (US Army Training and Doctrine Command)

HQ USATRADOC
Director of Combat Developments
Cost Analysis Division
Ft. Monroe, Virginia 23651

60. The Rand Corporation

The Rand Corporation
1700 Main Street
Santa Monica, California 90406

61. U.S. Army Missile Command

U.S. Army Missile Command
Plans and Analysis Director
Cost Analysis Division
Redstone Arsenal, Alabama 35898-5000

62. U.S. Army Weapons Command

U.S. Army Weapons Command, (subdiv name)
Rock Island Arsenal
Rock Island, Illinois 61299-6000

63. USAMC (US Army Materiel Command)

Department of the Army, HQ AMCSM/PIR
5001 Eisenhower Avenue
Alexandria, Virginia 22333

64. USAMC (US Army Materiel Command)

USAMC/MRSA
AMXMD-EL
Lexington, Kentucky 40511-5101

65. Commandant of the Marine Corps

Commandant of the Marine Corps
Code LMA-1
Washington, D.C. 20380

66. WRALC (Warner Robins Air Logistics Center)

Department of the Air Force
WRALC/(subdiv code)
Robins Air Force Base, Georgia 31098

AUTOMATION CONSISTENCY LIST

Equipment

VAX ****	(e.g., VAX 8600, VAX 11/780, VAX 780)
AFLC CREATE	
GE Timeshare System	
Tektronix ****	(e.g., Tektronix 4054, Tektronix 4051)
CDC 170 Model 730	
CDC ****	(e.g., CDC 3600, CDC 6600)
CREATE	
Digital	
HP ****	(e.g., HP 1000, HP 3000, HP 9830)
IBM ***	(e.g., IBM 360, IBM 360/65)
IBM PC XT/AT/Compatible	
IBM PC/Compatible	
On-line System (OLS)	
UNIVAC ****	(e.g., UNIVAC 1100, UNIVAC 1100/83)
WANG	
Zenith Z-***	(e.g., Zenith Z-100, Zenith Z-248)

Memory

****K RAM	(e.g., 128K RAM, 256K RAM, 640K RAM)
DSDD floppy drives	

Language

BASIC	
C Language	
COBOL	
CONDOR DBMS	
EQUEL FORTRAN	
FORTRAN	
FORTRAN 77	
FORTRAN IV	
Assembly	
DCL	
INFO DBMS	
Lotus 1-2-3	
Microsoft	
ORACLE	
Pascal	
VAX COBOL	
ZBASIC	
dBase II	
dBase III	

Operating System

DOS
DOS 2.0 or greater
MS-DOS
PC-DOS
Z-DOS
NOS 2.2 Level 602
PRIMOS
TSO
VMS

APPENDIX F
ACRONYM AND KEY WORD LISTS

ACRONYMS

A

AD	Armament Division
ACAP	Army Advanced Composite Airframe Program
ACWP	Actual Cost of Work Performed
ADP	Automated Data Processing
AF	Air Force
AFA	Automated Financial Analysis
AFLC	Air Force Logistics Command
AFR	Air Force Regulation
AF/RDQ	Air Force Directorate of Operational Requirements
ALC	Air Logistics Center
AMPR	Aeronautical Manufacturers Planning Report
ANG	Air National Guard
AP	Aircraft Procurement
ASD	Aeronautical Systems Division
AVFUEL	Aviation Fuel

B

BAC	Budget at Completion
BACE	Budget Analysis Cost Estimating
BCWP	Budgeted Cost of Work Performed
BCWS	Budgeted Cost of Work Scheduled
BMDO	Ballistic Missile Defense Office
BMI	Bismaleimide
BPI	Bits Per Inch

C

CACE	Cost Analysis Cost Estimating
CAIG	Cost Analysis Improvement Group
CBS	Cost Breakdown Structure
CCB	Configuration Control Board
CCDR	Contractor Cost Data Reporting
CCMAS	Construction Cost Management Analysis System
CER	Cost Estimating Relationship
CIR	Cost Information Report
CIRF	Contractor's Intermediate Repair Facility
CLIN	Contract Line Item Number
CLS	Contractor Logistics Support
CNO	Chief of Naval Operations
COCOMO	Constructive Cost Model
COO	Cost of Ownership
CPR	Cost Performance Report
CSCI	Computer Software Cost Item
CSI	Construction Standards Index
C/SSR	Cost/Schedule Status Report

D

DA Department of the Army
DACS Data and Analysis Center for Software
DBMS Data Base Management System
DCA Defense Communications Agency
DCS Defense Communications Systems
DDN Defense Data Network
DDT&E Design, Development, Test and Evaluation
DEC Engineering Cost Management
DLSIE Defense Logistics Studies Information Exchange
DMS Defense Materiel Systems
DOD Department of Defense
DRU Depot Repairable Units
DSARC Defense System Acquisition Review Council
DSN Defense Switched Network
DT/OT Development Test/Operational Test

E

EAC Estimate at Completion
ECM Electronic Countermeasures
ECP Engineering Change Proposal
ED Engineering Development
E&D Engineering & Design
ERADCOM US Army Electronics Research & Development Command
ESD Electronic Systems Division
EW Electronic Warfare

F

F.A.I.T. Fabrication Assembly Integration and Test
FLIR Forward-Looking Infrared
FSD Full Scale Development
FPA Focal Plane Array

G

G&A General and Administrative
G&C Guidance and Control
GFE Government Furnished Equipment
GPS Global Positioning System

H

HOL High Order Language
HP Hewlett Packard
HQ Headquarters

I

I&A	Integration & Assembly
ICA	Independent Cost Analysis
ICBM	Inter-Continental Ballistic Missile
ICE	Independent Cost Estimate
IIOC	Interim Initial Operational Capability
ILS	Integrated Logistics Support
IR	Infrared

L

LCC	Life Cycle Cost
LOS	Line-of-Sight
LRE	Latest Revised Estimate
LRU	Line Replaceable Unit
LSC	Logistics Support Costs

M

MDS	Mission Design Series
MIL-STD	Military Standard
MMH/FH	Maintenance Manhour per Flying Hour
MPA	Military Personnel, Army; Military Pay and Allowances
MPN	Manpower Procurement, Navy
MQT	Model Qualification Test
MR	Management Reserve; Modification Request
MTBD	Mean Time Between Demand
MTBF	Mean Time Between Failure
MTBMA	Mean Time Between Maintenance Actions
MTBR	Mean Time Between Removal

N

NAVFAC	Naval Facilities Engineering Command
NAVMAT	Naval Materiel Command
NAVSEA	Naval Sea Systems Command
NAVWESA	Naval Weapons Engineering Support Activity
NC	Numerical Control (computer controlled machines)
NGT	Next Generation Trainer
NRTS	Not Repairable This Station

O

O&S	Operating and Support
OH	Overhead
OMA	Operation and Maintenance, Army

Q

P

PDC	Programming, Design, Construction
PEP	Producibility Engineering & Planning
PGSM	Precision-Guided Submunitions
PIP	Product Improvement Program
PME	Prime Mission Equipment
PMRT	Program Management Responsibility Transfer
POC	Point of Contact
POM	Program Objective Memorandum
PSE	Peculiar Support Equipment

0

Q/A	Quality Assurance
QC	Quality Control
QTO	Quantity Take-Off

8

R&D	Research and Development
R&M	Reliability & Maintainability
RDT&E	Research, Development, Test and Evaluation
RDT&EN	Research, Development, Test and Evaluation, Navy
RF	Radio Frequency
RIW	Reliability Improvement Warranty
RLA	Repair Level Analysis
RPV	Remotely Piloted Vehicle

5

SAR	Selected Acquisition Report
SCCR	Supplemental Contractor Cost Report
SD	Space Division
SDI	Strategic Defense Initiative
SDIO	Strategic Defense Initiative Office
SE/PM	Systems Engineering/Program Management
SHIPALTERS	Ship Alterations
SIP	Standard Initial Provisioning
SIRCS	Ship Intermediate Range Combat System
S/PM	System/Project Management

SRU Shop Replaceable Unit
SSD Space and Strategic Defense
ST/STE Special Testing/Special Test Equipment
STE Special Test Equipment
ST&E Special Test & Evaluation
STS Space Transportation System
SWBS Ship Work Breakdown Structure

T

TCTO Time Compliance Technical Order
TDME Test, Measurement & Diagnostic Equipment

U

UE Unit Equipment
UPC Unit Production Cost

V

VAMOSC Visibility and Management of Operating
 and Support Costs
VMAX Maximum Velocity

W

WBS Work Breakdown Structure
WER Weight Estimating Relationship
WPN Weapons Procurement, Navy

KEY WORD LIST BY FUNCTIONAL CATEGORY

A. Purpose/Objective

Cost Estimates/Analyses
Cost/Benefit Analysis
Data Base
Decision Support Systems
Economic Analysis
Financial Analysis
Manpower Estimates/Analyses
Performance Assessments
Planning/Programming/Budgeting
Program Analysis
Requirements Estimates/Analyses
Risk Analysis
Schedule Estimates/Analyses
Software Sizing

B. Costs Covered

Concept Definition Costs
Construction Costs
Development Costs
First Destination Transportation Costs
Indirect Costs
Lease Costs
Life Cycle Costs (LCC)
Modification Costs
Operating & Support (O&S) Costs
Production Costs
Warranty Costs

C. Type of Data

Cost Data
Equipment Hour Data
Labor Hour Data
Manpower Data
Program Data
Schedule Data
Technical Characteristics Data

D. Analysis Techniques

Analog Techniques
Contract Analysis
Contractor Cost Data Report (CCDR) Analysis
Contractor Performance Report (CPR) Analysis
Cost/Schedule Status Report (C/SSR) Analysis
Curve Fitting
Econometric Forecasting
Engineering Buildup Techniques
Monte Carlo Simulation
Parametric Techniques
Selected Acquisition Report (SAR) Analysis
Statistical Analysis

E. Relationships

Cost Estimating Relationships (CERs)
Cost Factors
Escalation Factors
Escalation Indices
Learning Curves
Manpower Estimating Relationships (MERs)
Planning Factors
Schedule Estimating Relationships (SERs)
Weight Estimating Relationships (WERs)

F. Work Breakdown Structure

Cost of Money (COM)
Engineering
Engineering Change Orders (ECO)
Facilities
Flyaway
Forces
Functional Breakdown
Government Furnished Equipment (GFE)
Installation
Integrated Logistic Support (ILS)
Labor/Materials Breakdown
Maintenance
Management Reserve
Manufacturing
Markup
Nonrecurring/Recurring Breakdown
Overhead
Peculiar Support Equipment (PSE)
Primary Resource Breakdown
Prime Mission Equipment (PME)
Procurement Support
Profit

Site Activation
Spares
SWBS Weight Groups
Test & Evaluation
Tooling & Test Equipment
Weapon Systems

G. Equipment Covered

ADP
Aircraft
Aircraft (Airframe)
Aircraft (Engines)
Aircraft (Modifications)
Aircraft (RPV)
Armament
Avionics
Command & Control Systems
Communications
Composites
Electronics
Electronics (Electro-Optical)
Electronics (Electronic Warfare)
Electronics (Identification)
Electronics (Laser)
Electronics (Navigation)
Electronics (Night-Vision)
Electronics (Radar)
Electronics (Sensor)
Electronics (Sonar)
Missiles (Strategic)
Missiles (Tactical)
Munitions
Precision-Guided Submunitions
Satellite Earth Stations
Ships
Software
Software (Embedded)
Space Systems
Space Systems (Spacecraft)
Vehicles
Vehicles (Tracked)
Vehicles (Wheeled)

Authority File by Key Word
Entire File

Key Phrase	Key Code
ADP	1
Aircraft	2
Aircraft (Airframes)	5
Aircraft (Engines)	3
Aircraft (Modifications)	4
Aircraft (RPV)	109
Analog Techniques	6
Armament	7
Avionics	8
Command & Control Systems	10
Communications	11
Composites	95
Concept Definition Costs	12
Construction Costs	13
Contract Analysis	14
Contractor Cost Data Report (CCDR) Analysis	9
Contractor Performance Report (CPR) Analysis	15
Cost Data	16
Cost Estimates/Analyses	17
Cost Estimating Relationships (CERs)	18
Cost Factors	19
Cost of Money (COM)	94
Cost/Benefit Analysis	78
Cost/Schedule Status Report (C/SSR) Analysis	20
Curve Fitting	110
Data Base	21
Decision Support Systems	79
Development Costs	22
Econometric Forecasting	24
Economic Analysis	25
Electronics	26
Electronics (Electro-optical)	96
Electronics (Electronic Warfare)	97
Electronics (Identification)	98
Electronics (Intelligence)	99
Electronics (Laser)	100
Electronics (Navigation)	101
Electronics (Night-Vision)	102
Electronics (Radar)	103
Electronics (Sensor)	104
Electronics (Sonar)	115
Engineering	27
Engineering Build-up Techniques	28
Engineering Change Orders (ECO)	89
Equipment Hour Data	29
Escalation Factors	30
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Facilities	31

Key Phrase	Key Code
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First Destination Transportation Costs	117
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Forces	85
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Government Furnished Equipment (GFE)	122
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Installation	35
Integrated Logistic Support (ILS)	34
Labor Hour Data	36
Labor/Materials Breakdown	90
Learning Curves	84
Lease Costs	119
Life Cycle Costs (LCC)	37
Maintenance	114
Management Reserve	38
Manpower Data	108
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Manpower Estimating Relationships (MERs)	40
Manufacturing	41
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Missiles (Strategic)	42
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Modification Costs	44
Monte Carlo Simulation	45
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Nonrecurring/Recurring Breakdown	47
Operating & Support (O&S) Costs	48
Overhead	49
Parametric Techniques	50
Peculiar Support Equipment (PSE)	51
Performance Assessments	52
Planning Factors	53
Planning/Programming/Budgeting	80
Precision-Guided Submunitions	54
Primary Resource Breakdown	92
Prime Mission Equipment (PME)	55
Procurement Support	87
Production Costs	56
Profit	58
Program Analysis	81
Program Data	59
Requirements Estimates/Analyses	82
Risk Analysis	60
Satellite Earth Stations	23
Schedule Data	62
Schedule Estimates/Analyses	63
Schedule Estimating Relationships (SERs)	64

<u>Resource Title</u>	<u>ID Number</u>
ACES (Automated Cost Estimating System)	1.F.0005
AD Competition Model	1.F.0032
AD Risk Model	1.F.0041
ADAM (Automated Data Base for Acquisition of Missiles)	2.A.0008
Advanced V/STOL & CTOL Aircraft CERs	1.N.0041
Advanced V/STOL & CTOL Aircraft Cost Data Base	2.N.0019
Aerospace Software Sizing Data Base	2.F.0003
AF Facility Pricing Guide	1.F.0064
AFA (Automated Financial Analysis) System	1.N.0008
Affordability and Cost Effectiveness Analysis Data Base	2.C.0001
AFLC Cost and Planning Factors	1.F.0083
AFLC Logistics Support Cost (LSC) Model	1.F.0069
AFSC Cost Estimating Data Base (CEDB)	2.F.0024
AFSC Life Cycle (O&S) Cost Model	1.F.0098
AFSC Production Rate Variations Model	1.F.0045
AFSC Risk Model	1.F.0040
AGMC Life Cycle Cost Model	1.F.0114
AIM/AGM Logistics Reliability Assessment & Captive Carry	1.F.0111
Air-Launched Missile Operating & Support (O&S) Cost Model	1.N.0032
Aircraft Airframe CERs: All Mission Types	1.P.0014
Aircraft Airframe CERs: Fighters	1.P.0015
Aircraft Airframe Data: Bombers and Transports	2.P.0003
Aircraft Airframe Group Manhour and Cost Data	2.F.0025
Aircraft Availability Model (AAM)	1.F.0120
Aircraft Cost Handbook	2.F.0016
Aircraft Engine Data	2.N.0010
Aircraft Integration CERs-Modif. & Avionics Install/Retrofit	1.F.0009
Aircraft Learning Curve Manual	2.N.0003
Aircraft PIP and ECP Economic Analysis Data	2.A.0005
Aircraft Structural Modification Cost Study	1.F.0104
Aircraft, Missile, Engine R&D, Production Estimates & Data	2.F.0013
Airframe CERs, with Particular Emphasis on Composites	1.F.0113
ALCCM (Army Life Cycle Cost Estimation Model)	1.A.0014
ALERT (Air Logistics Early Requirements System)	1.F.0082
ALPOS Data Base	2.F.0007
ALPOSII (Avionics Lab Predictive O&S Cost Model)	1.F.0073
AMCST (Aircraft Gun System Ammunition Cost Model)	1.N.0043
Ammunition Cost Research Study	1.A.0008
AMOS (AVSCOM Maintenance Operating and Support Cost) Model	1.A.0007
ARI/SDIO Programmed Interactive Cost Estimating System-PICES	1.C.0001
ARI/SDIO Top-Level Estimating Architecture Model (TEAM)	1.C.0002
Army Helicopter Parametric Life Cycle Cost Model	1.A.0005

<u>Resource Title</u>	<u>ID Number</u>
ASCOs (Navy Air-Launched Missile O&S Cost Estimating Model)	1.N.0047
ASD Aircraft Retrofit Cost Model	1.F.0024
ASDL (Automated Software Design Library)	1.F.0010
ASN (S&L) Graphics Generator	1.N.0009
ASSCM (Avionics Software Support Cost Model)	1.F.0052
Automated Cost Evaluation/Microcomputer Based System (ACE/M)	1.F.0003
Automated Financial Analysis System	1.F.0004
Automatic Cannon Ammunition Production Facilities Cost Model	1.A.0027
Avionics Acquisition Cost Estimating System (AACES)	2.F.0022
Avionics and Missile System Installation Cost Data	2.N.0013
Avionics and Missile System Installation Cost Model	1.N.0021
Avionics Attitude Control Cost Estimating Relationships	1.P.0012
Avionics Cost and Technical Data on USAF Aircraft	2.O.0010
Avionics Cost Data	2.F.0031
Avionics Cost Element Factors and CERs	1.F.0090
Avionics Data Base	2.O.0001
Avionics Data for Cost Estimating	2.P.0001
Avionics Installation Cost Model (AVSTALL)	1.F.0001
Avionics Software Cost/Schedule Model Optimization-CDC Vers.	1.F.0074
Avionics Software Costing	1.F.0053
Avionics/Electronics Decision Support Tool	1.F.0132
BMC Software Cost Model Version 2.0	1.F.0006
BMSCER (Base Material Support Cost Estimating Relationships)	1.F.0099
BPELX (Ball Park Electronics Manufacturing Cost)	1.N.0052
BRAT (Budget/Readiness Analysis Technique) Version III	1.F.0119
CACE (Cost Analysis Cost Estimating)	1.F.0105
Cargo/Transport Type Aircraft CERs	1.F.0145
Cargo/Transport Type Aircraft Data Base	2.F.0034
CAS (Cost Analysis System)	2.O.0004
CBFUEL	1.F.0136
CDAAP (Cost Data Analysis Aid Program)	2.N.0004
CEAC Software Sizing and Cost Model	1.A.0010
CECA (Cause Effect Cost Analysis) Program	1.F.0127
CEDM (Cost Estimation Documentation Model - Bootstrap II)	1.A.0026
CERs & Cost Data for Ship Combat System Life Cycle Costs	1.N.0022
CERs for 1st Destination Transportation Costs for Ammunition	
1.A.0021	
CERs for Airborne Array Radars, FLIRs and Avionics Logistics	1.F.0134
CERs for Army Helicopter Composite Airframes	1.A.0023
CERs for Future Military Radar Systems	1.F.0036
CERs for Millimeter Wave Radar Seekers	1.N.0034
CH-47 Modernization Program Operating Cost Model	1.A.0015

<u>Resource Title</u>	<u>ID Number</u>
Circuit Board Manufacturing Cost Model	1.N.0046
CMS (Cost Management Systems)	1.F.0007
Combat Aircraft Avionics Production Cost Data	2.F.0011
Combat Aircraft Avionics Production Costs CERs	1.F.0022
COMM STARS (Communications Equipment Data Base & DBMS)	2.A.0003
Comparison of Cost Models for Fighter Aircraft	1.P.0016
Component Support Cost System (CSCS)	2.F.0033
Composite Material Cost Per Pound	2.F.0015
Computer Model for Aircraft PIP and ECP	
Economic Analysis	1.A.0002
Computer Model Life Cycle Cost-Joint Tactical	
Communications	1.A.0009
Construction Cost Management Analysis System (CCMAS)	1.F.0062
Contracts Data Base	2.N.0008
CORE (Cost Oriented Resource Estimating)	1.F.0037
CORE F (Cost Oriented Resource Estimating	
Factors) Model	1.F.0043
CORE86 (Cost Oriented Resource Estimating) Model	1.F.0055
COST	1.N.0007
Cost Data for Ship Combat System Life Cycle Costs	2.N.0014
Cost Data for Tactical Surveillance & Fire	
Control Radars	2.O.0006
Cost Factors Data Base	2.F.0032
Cost Factors for Aircraft and Missiles	1.F.0094
Cost Factors Used for Estimating	1.F.0091
Cost Implications of Hardware/Manpower Balance	1.B.0002
Cost Model for Large Focal Plane Arrays	1.F.0017
Cost Model For Strategic Air-Launched Missiles	1.F.0109
Cost Model for Tactical Surveillance & Fire	
Control Radars	1.O.0001
Cost of Ownership for Aircraft Model	1.F.0057
Cost of Reliability Programs Statistical Relationships	1.F.0087
Cost Performance Forecasting Model ("Karsch" Model)	1.F.0071
CPRAM (Cost Performance Report Analysis Model)	1.N.0031
CPRAM-A (Army Cost Performance Report Analysis Model)	1.A.0022
Cruise Missile Relative Cost CERs	1.A.0028
Curve Fit Utilities for Cost Analysis	1.N.0003
DACS (Data and Analysis Center for Software)	2.F.0021
DAPCA III	1.F.0129
Data Base for Costing Soviet Weapons Systems	2.P.0004
Data for Ramjet Engine Production CERs	2.N.0011
Data Base for Army Helicopter Composite Airframes	2.A.0007
DCA Cost and Planning Factors, DCA Circular 600-60-1	2.K.0001
Defense Data Network Baseline Cost	1.K.0003
Defense Switched Network (DSN) Life Cycle Cost Model	1.K.0002
Delta Research Corporation Cost Estimating System	1.F.0137
Development & Production CERs for Aircraft	
Turbine Engines	1.F.0020
Development & Prototype Costs for General Ground	
Radar Sys.	1.F.0118

<u>Resource Title</u>	<u>ID Number</u>
Digital Subsystem w/VLSI/VHSIC Microcircuits Cost Estimates	1.F.0125
DMCER (Depot Maintenance Cost Estimating Relationships)	1.F.0018
DoD Cost Analysis Data Base System (CABDS)	2.F.0009
Dollars/Engine Test Hour	1.N.0005
Dollars/Engine Test Hour Data	2.N.0012
Dyna-METRIC (Dynamic Multi-Echelon Assessment Model)	1.F.0063
Economic Data Base	2.N.0024
EEAM (Economic Escalation Analysis Model)	1.N.0030
EFCACE (Expanded Fleet Cost Analysis Cost Estimating)	1.F.0085
Electro-Optical, Missile, Radar & Avionics System Cost CERs	1.O.0003
Electro-Optical, Missile, Radar & Avionics Systems Cost Data	2.O.0003
Electronic Systems Cost Data Base and CERs	1.N.0040
Electronic Systems Cost Data Base and CERs	2.N.0020
Electronics Cost Estimating Model	1.N.0004
Electronics Cost Per Aircraft Unit Cost Curves	1.F.0050
Electronics Industry Cost Estimating Data Update	2.S.0001
ELSIE (Electronic Subsystems Integration Estimator)	1.F.0128
ESD Software Cost Data Base	2.F.0001
ESD Software Sizing Data Base	2.F.0002
ESD/ACC Cost Factor Study	1.F.0028
ESD/ACCE Automated Software Estimating Tool	1.F.0002
ETA Technologies Cost Models	1.F.0130
Executive Information System Cost Performance Report (CPR)	2.F.0014
Facilities Lease or Buy Model	1.K.0001
Facility Cost Guide	1.F.0096
Factors, Formulas, and Structures for Life Cycle Costing	1.P.0006
FAST-E	1.F.0080
FAST-F	1.F.0079
FATES (Fixed and Transportable Earth Stations) Cost Model	1.F.0025
FATES (Fixed and Transportable Earth Stations) Cost Data Base	2.F.0026
Flight Test Data Analysis	1.F.0107
FORCEFAX (Force Cost Factors Model)	1.A.0013
FY89 Budget Year Cost Factors	1.F.0146
Generic Contractor Cost Model	1.F.0065
Generic Provisioning Data CER	1.F.0088
Generic Systems Model	1.F.0058
GFM Data Base	2.N.0023
Gompertz Time Phasing Program	1.N.0050
Hahn & Stone Software Transfer Cost Model	1.F.0034
Helicopter Production Costs	1.N.0045
HELSCOM (High-Energy Laser Systems Cost Model)	1.F.0077
High Energy Upper Stage Cost Model	1.F.0016
Historical Aircraft Program, Schedule Data	2.F.0020
Historical Cost Factor Source Book	1.F.0095

<u>Resource Title</u>	<u>ID Number</u>
Historical Inflation Indices for Army Aircraft Procurement	1.A.0003
ICBM Flyaway Cost Model	1.F.0008
INCADS (Integrated NAVAIR Cost Analysis Data System)	2.N.0005
Industrialized Building Construction Time/Cost Model	1.A.0018
Inflation Program	1.N.0049
INSURV	2.N.0022
Investment (Non-Recurring & Production Support) CERs	1.F.0092
IRLA (Item Repair Level Analysis)	1.F.0023
JCAP Make or Buy Model	1.A.0016
Jenson Software Decision Support Tool (ETA Model)	1.F.0133
Joint Tactical Communications Office LSC Estimation Model	1.A.0024
Labor Hour & Direct Cost Estimating Relationships (CERs)	1.F.0115
Lasercom Cost Model	1.F.0014
LCC Methodology for Tactical Remotely Piloted Vehicles	1.N.0001
LCC-2A (Program LCC Documentation)	1.F.0116
LCCA (Life Cycle Cost Analysis Model)	1.P.0013
LCCH Model Version 1.3	1.F.0076
LCOM (Logistics Composite) Model	1.F.0112
LEARN/RATE	1.N.0006
Learning Curve Program (LCURVES 1/BASIC)	1.F.0103
LERNCV	1.F.0029
Life Cycle Cost Decision Support Tool	1.F.0131
Life Cycle Cost Elements (LCCE)	1.F.0093
Life Cycle Cost Model for Aircraft Engines	1.F.0086
Life Cycle Cost Model for Defense Materiel Systems (CLANCY)	1.M.0001
Life Cycle Cost Model for Equipment Analysis	1.N.0015
Life Cycle Cost Model for Inertial Navigation Systems	1.F.0123
Life Cycle Cost Study Data for High Energy Laser Systems	2.F.0029
Life Cycle Cost Study for High Energy Laser Systems	1.F.0048
Lot Cost	1.F.0044
LSC (Logistics Support Cost Model)	1.F.0070
MACE	1.F.0110
MAD (Missile Analysis and Display Cost Model)	1.A.0025
Major Weapon System Life Cycle Cost Model	1.N.0014
Management Reserve Cost Estimating Relationship (CER)	1.F.0038
MANPOWER: Tactical Aircraft Maintenance Personnel Rqmts	1.O.0009
Marginal Pipeline Cost of Enlisted Personnel	1.B.0001
Marine Corps Life Cycle Cost Model	1.M.0002
Maurer Factor	1.N.0012
Means Data Base (Construction Cost Index)	2.F.0018
Medical Equipment Data Base	1.F.0060
MHE (Munitions Handling Equipment) Model	1.F.0122
Microcircuit Cost Factors	1.F.0054
Military Construction Engineering and Design Cost Forecast	1.A.0019

<u>Resource Title</u>	<u>ID Number</u>
Military Construction Supervision & Administration Cost	1.A.0020
Mini-RPV (Remotely Piloted Vehicle) Life Cycle Cost Model	1.A.0004
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